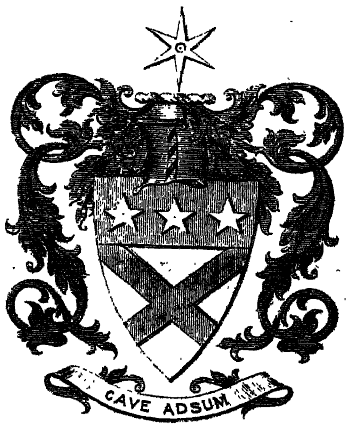
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AGRICULTURAL RESEARCH INSTITUTE

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TRANSACTIONS

OF THE

HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND.

JULY 1861—MARCH 1863.

III Ser.
Vol. X

NEW SERIES.

WILLIAM BLACKWOOD AND SONS, EDINBURGH;
AND 37 PATERNOSTER ROW, LONDON.
MDCCCLXIII.

CONTENTS.

TRANSACTIONS

OF THE

HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND.

PRELIMINARY NOTICE.

In accordance with the long-established practice of the Society, it is the duty of the Directors to submit, by way of preliminary notice to the first number of each new volume of the Transactions, a brief summary of the Society's progress and proceedings during the two preceding years, and they have, accordingly, to report as follows:—

I. Members.—The constituency continues steadily to increase. In 1859 the number of members was 3658; it is now 3941.

II. Finance.—The position of the Society is also prosperous in this department. In January 1859, the funds amounted to £43,476, 8s. 5d. At the commencement of the current year they were £46,972, 1s. 4d., notwithstanding the expenditure of a considerable sum on the enlargement of the Hall. A portion of this increase arises from the improved value of some of the stock in which investments have been made; but, irrespective of this source, a sum of £892, 17s. 8d. has been added to the Capital Fund. This progressive accumulation has sometimes been challenged as unnecessary and inexpedient; but in the Preliminary Notice to the Transactions for 1859, it was fully explained that, by the provisions of the Charter, as well as on prudential grounds, it is necessary to set aside for investment, a certain portion, fixed at one-third, of each life composition, as a substitute for the annual subscription which it extinguishes. Had this rule not been observed, and had compositions been spent as received, it is obvious that the resources of the Society, and its ability to carry out its objects, would now be circumscribed, and limited to an income dependent on the annual payments of a third of its Members.

III. General Shows have been held at Edinburgh in 1859, and at Dumfries in 1860. As Exhibitions, both meetings were of a

satisfactory and successful character. At Edinburgh the receipts were slightly in excess of the expenditure; at Dumfries, as was anticipated, there will be a considerable deficit; its precise amount cannot yet be stated, as the subscription by the county of Wigtown has not been reported; it may, however, be assumed that the Society will have to contribute about £780 to the Premium Fund. In considering the cost of the Shows, regard must now be had to the greatly increased expenditure consequent on the changes recommended by the Committee of 1859, which were for the first time introduced at Edinburgh. By these, the Meetings are extended over a longer period; a greater number of Judges is required; the expenses of the official staff are increased; and covered accommodation for stock is provided, the rates for which, charged to exhibitors, are inadequate to meet the cost of erection. An approach to the comparative expense, under the old and the new systems, is afforded by contrasting the sum of £1201, 9s. 7d., which was paid last year on account of the show-yard at Dumfries, with that of £453, 2s. 8d., at the previous meeting there in 1845. Under these circumstances, it cannot be anticipated that the Shows will, on the average, be self-supporting as formerly, and the Society must be prepared for an occasional call upon its funds to meet a deficit; but such an appropriation of them cannot be regarded as illegitimate, so long as it tends to promote the success and maintain the character of so important a department.

The arrangements for the meeting at Perth this year are in an advanced state, and promise a result worthy of the great agricultural district of which that city is the centre.

On a requisition emanating from the counties of Berwick, Roxburgh, and Selkirk, it had been resolved to hold a Show at Kelso in 1862; and the classes of stock for which premiums were afterwards to have been announced, have been published. In deference, however, to a desire expressed in a memorial addressed to the Directors by a public meeting lately held at Kelso, as well as to an opinion generally entertained elsewhere, that the international exhibition in London would, especially as regards implements, interfere with the success of the Kelso meeting, it has been resolved to postpone it till 1863. The Directors contemplate the possibility of making such arrangements as will encourage and assist Scottish breeders to send stock to the Show which is to be held in Regent's Park next year; but as this must depend on the concurrence of the Royal Agricultural Society of England, it would be premature at present to make any announcement on the subject.

IV. Local Competitions.—With the increased financial means at the disposal of the Society, greater development has been given to this most beneficial branch of its operations. During the current year the Society's premiums under this department will be extended over not less than 116 districts; a large sum of money,

besides honorary awards, will be spent in co-operating with local associations, and in encouraging the breeds most suitable for different parts of the country,—thus usefully disseminating, not only the pecuniary aid of the parent Society, but the influence and practice of its rules and regulations.

V. THE TRANSACTIONS continue to be published by Messrs Blackwood, and to convey to the public the reports of experiments, and other papers, to which premiums have been adjudged, the proceedings at monthly meetings, the valuable contributions furnished by Dr Anderson, and the official lists of awards. The Directors have now in consideration the propriety of effecting a further reduction of price in favour of members. At present the selling price to the public of Transactions and Journal is 12s. annually, from which members are entitled to a drawback of 4s., and it is proposed to increase this privilege to the extent of enabling them to obtain the publication at half price, or six shillings annually. In connection with this question, the propriety of a gratis circulation has received serious consideration, and was negatived principally for two reasons—1st, Because its cost would cripple the means now available for general shows or local competitions; 2dly, Because the privilege, added to the money value of those already in a member's power, would, in many instances, materially exceed the amount of his subscription.

VI. THE CHEMICAL DEPARTMENT continues to be carried on by Dr Anderson to the satisfaction of the Directors, who have to acknowledge, in addition to the large amount of matter contributed to the Transactions, the important investigations conducted by him in the laboratory. Although the number of analyses made for members is very large, it is apprehended that if their privileges in connection with this department, and the facilities it affords them for obtaining analyses and advice, were better known, this department of the Society's operations would be still further made use of. Irrespective of the advantage of being enabled to command the earliest services of a first-class chemist, a member has the benefit of a table of fees, regulated between the Society and Dr Anderson, and representing rates considerably less than he, and chemists of similar eminence, are in the habit of charging others, and which have had the effect of lowering generally the prices which agriculturists would otherwise have to pay for such information.

VII. THE VETERINARY COLLEGE continues to be efficiently and prosperously conducted. The number of students resorting to it from all quarters is increasing, and the reports which the Directors receive from the eminent Professors, and the members of the medical and venary professions, who form the Society's Veterinary Committee and Board of Examiners, contain the most gratifying assurances of the manner in which Professor Dick and his staff of teachers discharge their important duties. During the last two years the following

students have obtained the Society's diploma certifying their fitness to practise as veterinary surgeons :—

April 1860.—John Midgley, Birkenhead; John Short, Madras, E.I.; John L. Poett, Curragh Camp; William Gordon, Kirkmichael; Robert G. Currie, Aberdour; John Gray, Lanarkshire; John Stewart, Glasgow; Benjamin Smith, Ulverston; Andrew G. Ross, Glasgow; Richard Rutherford, Edinburgh; Robert Reed, Shireshill; James Preston, Mallow; Thomas Coates, Barden Mill; Jacob Dawson, Allenheads; James Bale, Pateley Bridge; Alexander Pottio, Renfrew; John M'Dougall, Old Kilpatrick; John H. Burbages, Manchester; James Connochie, Westruther; James Peebles, Forfarshire; James Fingzies, Kinross; Owen Reilley, Wistown; Henry Thompson, Allonby; John Dow, Anruber; Henry Martin, Scone; Thomas Reid, Durham; Joseph Pears, Penrith; Godfrey Smith, Barnsley; George Bremner, Forfar; John Brosnan, Tralee; Andrew Simpson, Coupar-Angus; James Wilson, Leeds; Andrew Ganley, Dublin.

April 1861.—John Bell, Carlisle; Hugh M'Millan, Aberfeldy; John Womack, Corbridge, Northumberland; John Balfour, Montrose; Robert Dickie, Yoker; Thomas Wainwright, Sherburne, Yorkshire; Daniel M'Lean, Glasgow; Joseph Tait, Portsoy; Alexander Brackenridge, Holytown, Lanark; George Scott, Earlston, Berwickshire; Duncan M'Nab M'Eachran, Campbeltown; William Kerr, Beith, Ayrshire; Thomas White, Corwen, Wales; William Hardy, Durham; William Hall, Sedgefield, Durham; Alexander Gillespie, Corstorphine; Charles Gray, Wishaw; Samuel J. Wills, Axminster, Devon; Peter Walker, Luss, Dumbarton; Andrew Smith, Dalrymple, Ayr; Andrew Robb, Parkhead, Glasgow; Septimus Lambert, Manchester; Alexander Hamilton, Midlothian; George Steward, Penrith; Henry Ramsay, Aberdeenshire; James Donaldson, Paisley; William Gregory Willett, Cheshire; William Fleming, Oldham; Alexander Chisholm, Blackshields; John Cassie, Aderdeenshire; Thomas Jackson, Portadown, Armagh; Robert Laing, Carron; Peter Moir, Edinburgh; Michael F. Healey, Clare Castle; George Lewis, Monmouth; Neil M'Kechnie Baron, Old Deer, Aberdeen.

VIII. Within the same period the distinction of the Society's Agricultural Diploma has been conferred on—

William Norman, Oughterside, Carlisle.
George Campbell, Ballrogie, Coupar-Angus.

IX. Museum.—Owing to the want of room at Albyn Place, the Society's half-yearly meetings were transferred to the Museum Hall in 1854. Its greater capacity, however, has since been found inadequate to accommodate the increased number of Members, and in conformity with a general desire, a considerable sum was last year applied towards its enlargement and improvement, and the Society now possesses a Hall suitable for its wants, and worthy of its position. The Directors would remind Members how much the collection must depend on their assistance and co-operation, and they would express a hope that greater readiness will be evinced in forwarding to the Museum, for preservation and exhibition, remarkable specimens of grains, roots, woods, and indeed of all articles of special interest falling under the category of vegetable produce.

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By a Supplementary Charter under the Great Seal, granted in 1856, the Society is empowered to prescribe a Curriculum for Agricultural Education, and to grant Diplomas.

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EDINBURGH, *June* 1861.

CULTIVATION AND MANURE AS FERTILISING AGENTS.

By HENRY TANNER, Professor of Agriculture, Queen's College, Birmingham.

[Premium—Medium Gold Medal.]

IN order that a clear view may be taken of the relative value of these agencies, it is necessary that the nature of the soil should be examined, and its general properties understood. Soils may be considered as consisting of matter in three distinct conditions. The first has been termed *the active matter* of soils, because it exists in a condition capable of being dissolved in water, and consequently available for entering into the circulation of plants and ministering to their growth. It has therefore received the term *active*, as being ready for the immediate discharge of its duties; and in this respect it differs very materially from the two other portions of the soil. The second portion has been named the *dormant* matter of the soil, not that it is dead or useless, but simply in a state of inactivity, being insoluble in water, and therefore unfitted for entering into plants. It might, however, be said that all matter which is not active must be dormant, and this is quite true; but for the convenience of more clearly explaining the component parts of the soil, a further division has been found desirable, and hence we have a third portion, or the *grit* of the soil. We must, therefore, view the soil not as a homogeneous mass, but as consisting of ingredients congregated into three classes, as—

The *active* matter of the soil;
The *dormant* matter of the soil; and
The *gritty* portion.

By the aid of chemical analysis, each of these may be again subdivided into the several ingredients of which it may be composed. It will at once be evident that an analysis of the entire mass of the soil would give information which must be looked upon with caution, and used with discretion. If an agriculturist wishes to know the composition of any particular soil, it is manifest that he requires, not an examination of the entire soil, but to know the constituents which compose the *active ingredients* of the soil, for these are the materials which influence the immediate fertility of the soil, and regulate its productive character.

If you examine the three classes already named, you will see that they are simply distinct stages, through which the soil has progressed or is progressing. We have the grit or stony portion—the type of the original rocks, from which all soils are produced—and these are the fractured particles which have withstood the disintegrating action of the atmospheric agencies for a longer period

than the other portions. But as under the crumbling influence of the air, moisture, and change of temperature, these become broken up into a smaller and finer state, this gritty matter changes into the dormant matter of our soils, in condition and appearance forming part of the soil, but still insoluble, and therefore valueless as food for vegetation. Such then is the matter of the second class, or the dormant portion—viz., the finely disintegrated portions of the rocks and stones, apparently available for vegetable growth, but still not in a condition to fulfil that expectation. When, however, the dormant matter has been more fully acted upon by the chemical agents in the rain and air, then its character alters, and it no longer remains insoluble, but it readily dissolves in water, and consequently assumes the active condition. Thus, each of these stages is a progressive advance,—the *grit* will ultimately become the pulverised *dormant* matter, and this will advance into the *active* condition. For these reasons we may consider—

The active ingredients of the soil as the portion ready for immediate use;

The dormant portion to be rendered useful by cultivation;

The grit which is the store for future years.

We have every reason to believe that each of these portions may be composed of matter equally valuable as fertilising agents, but differing only in one respect—viz., the time of their being available for use. Dr Daubeny proposed the two appropriate terms of "*active*" and "*dormant*" for the two conditions already described, and, in a communication to the Royal Agricultural Society, has shown the extent to which this distinction exists in soils. From the analysis given, it appears that about one-half of the alkalies, and one-eighth of the phosphoric acid, were in an active form in the soils examined, and the remainder were *dormant*. If, therefore, a person had estimated the powers of the soil by its full analysis, he would have anticipated the aid of nearly double the quantity of alkaline matter, and eight times the quantity of phosphoric acid, which really existed in a form available for immediate use.

I shall now proceed to show the manner in which bodies existing in the soil in a *dormant* condition can be rendered active, and thereby available for the processes of vegetation. I need not do more than remind you that two agencies are very influential in accomplishing this. These are rain water and changes of temperature. Rain water is not *pure* water, but as it falls through the air it dissolves carbonic acid gas existing there. It also carries with it some of the atmospheric air, and these gases, being conveyed into the soil, perform very important duties, and contribute to the one which now claims our attention—viz., the conversion of the dormant ingredients of the soil into the active condition. Chemical research has proved that carbonic acid and oxygen co-operate in carrying on a slow and almost imperceptible action upon the in-

gredients of the soil, thereby changing the insoluble gritty matter of our soils into dormant matter, this again into the more complete and active state, and then they assist in the final appropriation of it by the crop. Thus, the same agents co-operate throughout the entire change, and enable matter to assume these new forms. This action is of a chemical character, but it is powerfully promoted by the mechanical assistance rendered by changes of temperature. The influence of this is to be traced to the fact that bodies when they are hot occupy more space than when they are cold; hence, by rendering a body hot and cold, you weaken its cohesive power. This is especially observable when the change of temperature is great, or when water is present in the soil. All have noticed the effects of frost upon the clods of soil in our fields,—how the frost binds them together with the hardness of a rock, and, when it thaws, crumbles them into a powder. This same action takes place *in the particles of the soil*, in a greater or less degree, according as they may be more or less exposed to the influence, and this breaking up of the soil exposes fresh portions to the action of the chemical agents spoken of. Thus the combined action of these very simple agents accomplishes by slow but steady action very material changes in the soil, rendering its fertilising ingredients available for our use, and unlocking the stores which nature has made for our present and future requirements. This is a very hasty sketch of the materials which we have to deal with; but we must go on to show in what manner the processes of cultivation render the soil more fertile by the development of its own resources.

The tillage of the land is designed to prepare it for the germination of the seed, and, finally, the perfection of the crop. For the accomplishment of the former, the land has to be brought into a state favourable for the germination of the seed, or, in more general terms, I should say, into that free and loose condition which is known to be so necessary a preparation for sowing. This condition, which is favourable for the first growth, is equally so for the subsequent perfection of the crop. The operations by which this result is gained consist of ploughing, rolling, harrowing, &c., and these are very beneficial in increasing the fertility of the land. In fact, we may view them as so many means for exposing the various parts of the soil to the action of the air, rain, frost, and light.

I have already stated that the carbonic acid and oxygen carried into the soil promote the chemical changes which awaken the dormant ingredients of the soil, and bring them into active exercise. In like manner, those parts of the soil which are upon the surface are exposed to these chemical changes, and thus a ceaseless action appears to be going on between them. This change is one by which the mineral matter of the soil is acted upon; but, in addition to this, we have other changes produced—viz., the decay of the *organic matter* of the soil—for the air and moisture promote changes

in its character, and thus render it valuable for promoting vegetable nutrition. It is, however, worthy of note that, whilst the organic matter of the soil is undergoing decay or decomposition, this change favours and promotes the conversion of the mineral matter of the soil from a comparatively useless state into a condition suited for the wants of our crops. Any process or operation which stirs the soil, and brings fresh portions under the influence of decomposition, promotes these changes in the organic and the mineral matter of the soil, thereby rendering them available for the nutrition of our crops.

In this manner *the stores of the soil are opened up and rendered useful;* but I have now to show that tillage operations not only accomplish this desirable result, but they also prepare the soil for abstracting from the atmosphere fertilising matter. The value of ammonia as a manure is well known, and upon its action the beneficial character of many of our manures is based. It is an expensive manure, but still its judicious use is remunerative in a very high degree. We send many thousands of miles for a large portion of our supplies, yet it is found in the atmosphere floating around us, and is there present in a condition available for the use of vegetation. It is not necessary or desirable for me to refer to the sources from whence it is supplied to the atmosphere; it is enough for us to know the valuable fact that there are abundant stores prepared for the cultivator who is ready to receive a supply therefrom. It is with great pleasure that I refer to a very valuable contribution to our knowledge of the principles which regulate agricultural practice by Professor Way. It will be found in the sixteenth volume of the Royal Agricultural Society's Journal. He there proves the presence of nitric acid and ammonia in the atmosphere; that these bodies are removed from the air in two ways—by the absorptive powers of the soil, and by the rain dissolving them and carrying them into the soil. He very judiciously remarks: "The atmosphere is to the farmer like the sea to the fisherman, and he who spreads his nets the widest will catch the most." It is not that all land derives equal advantage from this magazine of wealth, but land receives and profits just in proportion as the industry and intelligence of man render it capable of drinking in these fertilising matters.

Thus you observe there are two channels through which the nitric acid and ammonia of the atmosphere become introduced into the soil—the one by the direct absorptive powers of the soil, and the other by the intervention of rain bringing fresh stores within reach of the soil. With regard to the former of them, I may say, that although it does not come properly within the limits of the subject under our notice, still the practical connection is so manifest that I shall not refrain from going into some brief notice of it; but before doing so, I shall notice the agency of rain. This

must be viewed as an assistant agent which gathers the accumulations in the atmosphere, and brings them within the influence of the absorptive powers of the soil. If, therefore, such rain passes away on the surface without entering into the soil, it is manifest that its services are lost. Hence land which by natural or artificial drainage allows the rain to pass through it, carries into the soil its hidden treasure, which in any other case would pass away to some other recipient, or to the nearest streamlet. The value of its assistance to any agriculturist simply depends upon its services being accepted and turned to some useful account, or else rejected, and its agency wasted.

We may now notice the absorbent powers of our soils. The researches of Professor Way (published in the *Journal of the Royal Agricultural Society*, volume 15), are of the deepest importance to agriculturists. I will, therefore, briefly bring before you the results of these researches. It was observed that, when a solution containing ammonia (or other alkaline salts) was passed through a portion of soil, the soil separated the ammonia from the liquid, preserving it from being again washed out of the soil; and this action was finally traced to the presence of bodies in the soil, known as the double silicates. A silicate is a compound of silica with another body—say, for instance, silica and soda produce a silicate of soda—but the double silicates are very peculiar, for in these we have silica combining not with one body but with two bodies: for example, there is the double silicate of soda and alumina; the double silicate of lime and alumina; and a third, which is the double silicate of ammonia and alumina. But you will observe that alumina is present in each, and the only difference is that soda is present in the first, lime is present in the second, and ammonia in the third. In most soils we find these double silicates present, but their value varies very considerably. We may now observe the difference in their character and mode of action. The double silicate of soda and the double silicate of lime are each capable of separating ammonia when it is dissolved in water, but the double silicate of lime alone has the power of separating ammonia from the air; the double silicate of lime is, therefore, decidedly the more valuabe salt of the two. The double silicate of soda is readily converted into the double silicate of lime when lime is added to the soil, consequently the addition of lime to the soil renders it competent to absorb more ammonia from the atmosphere, and thereby gives it greater powers of acquiring fertilising matter than it previously possessed.*

In addition to this benefit another desirable result has been

* The more recent researches of others seem to demonstrate that the retention of ammonia by the soil is due not so much to chemical as to physical causes. Most soils can so far retain pure ammonia, but it is only those which contain lime that can first decompose the salts of ammonia and afterwards allow surface attraction betwixt the two to act.—ED.

attained by the use of lime—viz., that, as nearly all soils contain ammonia in them in a dormant state, the use of lime displaces part of this ammonia, and thereby this fertilising matter becomes available for the plants growing in the land.

Thus it is seen that in the soil there are bodies capable of separating ammonia from the rain as well as from the atmosphere, and afterwards preserving these fertilising stores until required for the crop. We have in the use of lime a double advantage; it not only gives the soil superior powers of acquiring that valuable fertilising matter ammonia, but it also renders the existing stores of dormant ammonia ready for active service in promoting vegetation. It is, however, of no practical value to us having in our soils the means of accumulating fertilising matter, if at the same time we place it in a position in which this power is rendered inoperative; consequently we have two means by which to promote the accumulation of ammonia in the soil, and these are—1st, increasing the capabilities of the soil to absorb ammonia; and, 2d, giving the atmosphere a free access to the soil, so that these powers may come into full operation. The addition of lime to the land has in this respect a double action—viz., it sets part of the ammonia in the soil free and available for promoting vegetable growth, and it also renders the soil more competent for accumulating a store which will maintain the fertility of the land; and thus we have in the use of lime as a manure, a valuable means of realising the first requirement—an increased absorbing power. The attention may now, however, be advantageously directed to the facilities for the increase of these powers, and these are manifestly twofold—viz., the exposure of the soil fully to the air, and the passage of rain through the land. The tillage of the land is therefore just the agency required to accomplish this desirable result; for as I have said before, the inversion, stirring, and crushing of the soil by the various operations of ploughing, cultivating, harrowing, and rolling, each and all promote the exposure of fresh portions of the soil for atmospheric action; and whatever capability is possessed for the secretion of ammonia, the soil is thus furnished with the opportunity for its exercise.

If you view our field labour as so many means for exposing every portion of the surface soil to the air, you will at once realise the value of many operations which we have hitherto only considered as of mechanical value in preparing the land for seed, by rendering it light, and giving the roots freedom for their growth and extension. But the advantages are double; for not only is it necessary for the luxuriant growth of a crop that it should be so placed that its roots have a freedom of action for searching after the food which the crop requires, but, as I have already explained, the means we adopt for attaining this result equally facilitate the success of the crop by the accumulation of fertilising

matter which is being simultaneously made. This free and loose condition of the soil is equally favourable for the passage of rain *into* the soil; and when this is properly assisted by an efficient under-drainage, then alone is the full advantage derived from the rain and its fertilising contents.

With a knowledge of these principles, if you review that old established practice of fallowing, you will not fail to detect the reason for past success in this practice, and you will see another instance of that true union which exists between practice and science, which every lover of agricultural progress hails with feelings of pleasure. The true principle of fallowing has been to expose the land to the wind, rain, frost, and heat, and to keep the land moving as much as possible. Manifest have been the advantages derived from extra ploughing, which *to the eye* appeared at the time productive of little change or benefit, but the succeeding crop has in many such cases given evidence of increased capabilities of production, which, until lately, has been set down as simply resulting from the mechanical condition of the soil being more favourable for growth, instead of its being also referred in part to the increase of food for the crop which was thus obtained.

The use of lime for fallows is an old established practice loudly decried by some as exhausting to the land, but still the practice was continued, because it was found to succeed; and now the practice has, by its successful results, survived the period of its condemnation, and entered into one of more honour, in which both practice and science agree to sanction and advise its use. Here let us all take a lesson for our future guidance, and remember that old established and successful practice has truth for its foundation, and although there may also be some error intermixed with it, yet we shall be unwise to condemn any successful practice as useless which our present imperfect knowledge cannot exactly approve of.

We have now to notice the influence of tillage operations upon the organic matter of the soil; and, without going into any unnecessary detail, I may remind you that the passage of rain water (and its associates from the atmospheric air) into the soil very materially assists in promoting the decay of these organic matters, and renders them serviceable for the support of vegetation. Thus every portion of the soil derives advantage from the tillage operations to which it is subjected. The mineral matter of the soil which is in an active condition is thus enabled to pass into the circulation of plants. Those portions of the soil which are not in an advanced stage, but lie *dormant* in the soil, are by the same power awakened to action, and transferred into an active state; whilst the insoluble grit of the soil has also gradually progressed into the next stage, or the dormant condition. The stores of ammonia which the atmosphere contains are gathered by the soil, and subsequently liberated when required by a growing crop; whilst the organic matter of the soil is also by

the same agency prepared to minister to vegetable productiveness. Thus we have nearly all the requirements of our crops supplied from natural sources, and these are rendered available by our various tillage operations.

The conclusion to which we are brought by these facts is, that tillage operations render free and available for vegetation certain fertilising matters which are essential for our crops, and that the degree to which the resources of any soil are developed is proportioned to the extent of these operations. Practically it matters but little whether so much alkaline matter, ammonia, and organic matter is added to the soil by manure, or converted from a dormant to an active condition. It is manifest that in both cases the soil is equally enriched by equal quantities of the same materials; but there is this advantage in favour of the tillage operations, that whilst the two methods may be equal in a chemical point of view, yet the mechanical conditions are very materially in favour of cultivation as a substitute for manure. The food being the same, equal results would be obtained, provided other conditions were equal; but if the mechanical condition of the soil is very much improved, it will enable the crop to grow more freely, and this is so much the more advantageous for the increase of the crop resulting from our tillage operations.

But what are the practical inferences we are to draw from these principles? Are we to consider our farms independent of our various manures? This would certainly be a premature conclusion. We see how advantageous the use of lime is, and our arguments are certainly in favour of its frequent employment in moderate quantities. It is equally clear that there is a great difference in soils as regards the mineral matter they contain; for if they do not possess the several ingredients which the crops require, our tillage operations cannot develop them, and hence such soils will still be dependent upon the supply of manure for fitting them for being productive.

Those soils which possess rich stores of the mineral matter required by plants will be enabled to yield them to vegetation under the assistance of good cultivation. But as the majority of our soils are very deficient in phosphates, and as these valuable fertilisers, even upon well-managed farms, are being continuously removed from the land, and do not in regular course of farm management find their way back again to the land, it is evident that few soils could withstand the removal of this important group of manures without some return being made periodically, and hence we may fairly anticipate considerable advantage from the continued employment of phosphatic manures. The value of farmyard manure will still be equally great, and its economical value will not be depreciated because of tillage operations being in some manner a substitute. They must rather stand side by side as valuable co-

operators in the same service, and not be looked upon as competitors. We must not prize our manures less, but value cultivation more highly; and I have no doubt that thus the standard of our crops will be materially raised, especially if an active cultivation of the land is supported by a well-managed homestead, in which food is economically consumed, and the manure carefully preserved and prepared for the use of the farm.

You may, however, justly require of me some practical results in support of the principles named. This I can readily furnish. In fact, I have already based my arguments upon the success which has generally attended the practice of fallowing, and upon which most conclusive evidence is to be obtained throughout the country. I should, however, be guilty of a great oversight if I omitted to make reference to the "Lois Weedon" system as another illustration of the principles I have already specified. Much as this has been a bone of contention both among practical farmers in different districts, as well as amongst scientific men, as to the principles involved, still I feel that I must not avoid making reference to it. Whatever may be our preconceived ideas respecting the nutrition of plants and the exhaustion of the soil, still here we have a fact establishing beyond doubt that wheat may be grown year after year upon land of moderate fertility; and notwithstanding that the soil has not been enriched by the use of manure, still the land has progressively increased in fertility, and the crops become more abundant and of superior quality. It is desirable that I should briefly notice some of the peculiarities of this system. The plan adopted by the Rev. S. Smith at Lois Weedon, in Northamptonshire, is to divide the field into lands 5 feet wide. In the centre of these lands, the wheat is dibbled at the rate of 2 pecks per acre in 3 rows, one foot apart, thus leaving a space of 3 feet in width unoccupied. When the plant is up strong, the whole of the land is dug with a fork and allowed to lie rough for the winter. In the following spring the land is levelled and well cleaned by the use of the horse-hoe, and this implement is freely used until the wheat is coming into blossom. The rows of wheat are then earthed-up with a mould-board, and in the furrows thus made the subsoil plough is used tolerably deep. To overcome the injurious influence on the wheat, which is found to arise from the land being too loose, the Crosskill roller is used before the ground is sown, and also in the following spring. In this manner one-half of the ground is occupied in producing wheat, whilst the remaining half is under fallow in preparation for the next year's crop. Under this system the produce of this land (not worth 30s. per acre), has been raised from 16 to 40 bushels per acre. The crops from 1847 to 1856 inclusive, averaged 34 bushels; the crop of 1857 produced 36 bushels; the crop of 1858 equalled 40 bushels: and thus the land, instead of showing any sign of exhaustion, gives

proof of increasing fertility. The question naturally arises, To what source are we to trace these anomalous circumstances, that with the repeated removal of these crops, without any compensation by manure, the soil advances in fertility? It can be referred to no other causes than those I have already named—the conversion of the dormant matter of the soil into an active condition, whilst at the same time, and under the same agency, the soil feeds upon the nitrogenised matter of the atmosphere, and secretes a store of food for the growth of the succeeding crop.* With facts before us like these, it is folly to doubt the possibility of such being done, or to set it aside as an incredible story. It would, however, be equally wrong to entertain the idea that the same results would be attained under other circumstances. Doubtless, there is much land upon which equally satisfactory results may be realised, but there are also many districts in which the system could not be followed out remuneratively. A moment's consideration will prove this. To produce a crop of wheat, the land has to yield up not only nitrogen in a state fitted for assimilation, but also mineral matter, and without these supplies a luxuriant crop cannot be produced. The nitrogen may be derived from two sources, the soil and the air; but *the mineral matter can only be supplied from the* SOIL. If by any plan we can render these supplies available with greater rapidity than the crops draw upon the land, then the productive powers of the soil are not reduced from the loss; but under other circumstances, the land must gradually become less productive. The plan adopted at Lois Weedon succeeds in maintaining the productive character of the land, and its success may be traced to two circumstances.

1st, That the soil contains the necessary supplies of mineral matter ready for being brought into use; and,

2d, That the tillage operations are capable of rendering these supplies available.

The absence of either of these conditions must produce a failure; for if the required mineral matter were absent from the soil, no amount of tillage could produce it; and so also if the mineral matter were present, but under circumstances which would not allow of its being rendered available, it could not be of any service to the crop. This is a system which can only be fully carried out upon soils possessing certain mineral ingredients required for the wheat crop, for its chief merit consists in *the development of hidden or dormant stores of fertility* which may exist in soils

* A good deal might be argued in favour of the chief supply of nitrogen in Mr Smith's successful practice being obtained from the decomposition of the organic matter in the soil, rather than by the soil absorbing it from the atmosphere. And also it may be argued, that in this case the wheat plants are placed in conditions favourable to their absorbing ammonia or nitric acid by their leaves from the air.—ED.

when little expected. In the case of the Lois Weedon soil, we have a thorough wheat soil, and hence its powers are brought into action; but whereas you cannot develop properties which are not possessed, you must not expect to carry out this plan upon soils of an opposite character. We must not, however, reject it entirely, even for these soils, for there is a most valuable lesson to be learnt from it, which will *always* be of service, and that is the proof it gives of the fertilising results of tillage operations. The Lois Weedon system may have its special districts for its successful or unsuccessful adoption, but the lesson we gather is of universal application—viz. that the culture of the soil is a most powerful and valuable cause of fertility.

We may, in conclusion, add a few remarks to what we have already stated as to the extent to which tillage operations are a substitute for manure. I have already shown that they are valuable promoters of fertility in all our soils, by the conversion of the dormant organic and inorganic matter they contain into fertilising materials fitted to support and nourish vegetation, and that at the same time the soil is rendered more competent for absorbing from the atmosphere nitrogenised matter. These results, though evident upon all soils, will be more manifest upon soils already possessing a fertile character, and upon such soils tillage might to some extent supersede the use of manure; but upon inferior soils, although beneficial results will be evident, still the advantages will not be equal, and there will be greater necessity for the use of manure. Upon whatever soil the trial is made, the result must of necessity be regulated by the composition of the soil. If a soil is being cultivated which requires a free supply of the phosphates, and there is a natural deficiency in the soil, it is clear that the use of some phosphatic manure will be desirable, for no extent of tillage can compensate for the absence of such a body. It is just the same with the other ingredients required by our crops. If the soil is fertile it possesses these stores, and then culture brings them into use. It may, however, be said, cannot a chemical analysis of the soil at once indicate whether or not a soil is competent or not for the successful application of this system? I reply, it may be a safe guide in some cases, but the indications of nature, by the general products of the land, will be a safer guide in the majority of cases. There is, however, one important advantage which will result from tillage operations, and that is the storing away in the soil much of the ammonia of the atmosphere. This will take place upon all soils, but upon rich clays and loams more especially so. This is another powerful inducement for stirring and exposing the land—we have seen how valuable lime is in producing this result, and that it is an important co-operator in the action. Hence tillage operations in no way supersede the use of lime, but render its action more beneficial; neither does the

cultivation of the land supersede the supply of manure for the crop when the land is deficient in one or more of the ingredients which the crop requires.

It is for these reasons, that whilst we value tillage operations as *most important* agencies for promoting the fertility of the land, we must not allow them to supersede the use of manure. We shall still find an economical use of our manures equally imperative and remunerative, and our higher appreciation of the great value of tillage operations will result in an increase of the average produce of our soils, rather than in depreciating the value of manures. Extremes are at all times dangerous. Whilst, therefore, we may more highly value tillage operations, and upon many soils realise thereby similar results to those attained from the use of ammoniacal manures, we must at the same time be cautious not to overlook the important results we obtain by the use of our various natural and artificial manures, and look to them as valuable promoters of fertility, which will always produce profitable results in proportion to the skill and discretion with which they may be prepared.

ON BRAXY IN SHEEP.

By JAMES COWAN, Glasgow (Premium, £10); and HUGH BORTHWICK, Traquair Knowes, Peebles (Premium, £5).

[Braxy still commits great ravages among the young stock of hill-grazings. Few diseases that prevail among our domestic animals are less under the control of the stock-master. Severe losses are often borne without much repining, for the disease sometimes appears so capricious in its attacks as to baffle at once all the skill derived from former experience. Every well-described instance of success or loss, following certain modes of management, are equally worthy of being recorded. The following report consists of such portions of two papers to which awards were made, as best bring out the character and nature of the disease, and the influences which tend to aggravate or mitigate, as well as prevent its attacks.—ED.]

MR COWAN describes the *symptoms* as under :—

"The first symptom exhibited by a sheep affected with braxy is a short step. This is discernible before they begin to lie down and rise frequently, or stand apart with the head depressed and the back arched—the disease having by this time made considerable progress. The contracted step is occasioned by pain in the bowels,

as it is observed before any swelling takes place to cause an impediment in walking. I have tested hoggs at night by this symptom, or had suspicions that they were affected, and in some cases they were dead in the morning; while in others they were only advanced to the next stage which I have mentioned, either lying down and rising alternately, or standing apart with the head and ears hanging down, the eyes dull, the belly swelled, and the back arched. At this stage the pulse is quick, and often irregular, and the breathing hurried and laborious. The cud is suspended by the time that the first symptom appears. There is seldom any passage in the bowels, while the urine is frequent and small in quantity. The blood is very dark and thick; and should an attempt be made to bleed at an advanced stage, it can be drawn only in drops from the jugular vein. Should the disease not terminate rapidly, and the animal hold out for some time, the wool begins to fall and have a dry appearance. The brain is not affected in the same manner as in louping-ill (or lung inflammation), as it is only in rare cases that they fall into convulsions. I have seen them stand on their feet until they fell down dead, as if shot. Although braxy and louping-ill are both internal inflammations—the former affecting the digestive, and the latter the respiratory organs—yet the symptoms which they outwardly exhibit are very different. In louping-ill the eye is unnaturally sharp, the step quick and light, and they bleed freely even at an advanced stage of the disease, although the blood is drawn to the seat of the disease as well as in braxy.

"It is not easy to say how long a sheep affected with braxy will hold out; the degrees of severity in its attacks are various, and it often is difficult to say how long the sheep may have been affected before it has been observed. I have seen them die in a few hours after being first noticed, although able to be driven for more than a mile from the hill; while others again, apparently as far advanced when first seen, lived from twelve to twenty-four hours. When bled and treated with physic, I have seen them live for two and three days. But it is mostly on lands, or at times when the disease is moderate, that these instances occur, as the greater number are either found dead, or live but a short time after being observed to be sick.

"It may be remarked that the *post-mortem* appearances of braxy are various. Yet in every case, as soon as the internal viscera is laid bare, the traces of inflammation are distinctly visible, extending more or less through the whole structure. Upon cutting through the lining membrane of the abdomen a most offensive smell is emitted. The bowels are inflated, and the whole internal cavity filled with a noxious gas; and in cases where the smaller intestines and the lining of the abdomen have been more particularly affected, a large quantity of bloody serum has been thrown out, and is floating around them. I may here mention that these

are the cases in which it is most difficult to draw blood from the jugular vein. The more prominent appearance of organic disease first presented is the inflamed state of the abomasum—the reed, as it is called, or fourth stomach. This is generally to such an extent as to sanction the common idea that it is the organ that is primarily affected. The usual results of acute inflammation, in the shape of large mortified spots, are spread over its surface, and to such an extent is the structure of the organ destroyed, that these are readily penetrated by the finger, while its inner coating is sometimes entirely black. All the other stomachs are inflamed more or less, especially the second, or king's-hood, as it is called. Next to the stomachs and bowels, the kidneys are most seriously implicated, and in severe cases they are reduced to a soft pulpy mass by the time that death takes place. The liver and lungs are also affected, although in such a way as to show that it is only through the blood that they are implicated in the general disorder. The contents of the first, second, and fourth stomachs are in a semi-liquid condition, and apparently in a state of fermentation; while those of the third stomach (omasum or manyplies) and the whole of the intestines are dry and hard, those of the latter being frequently held together by cords of bloody gelatinous matter, which makes it very difficult to open them, either by physic or injections of any description.

"When the weather is soft and humid the process of decomposition is very rapid. I have seen the whole body to the very hoofs swelled to an enormous extent within a few hours after death; the skin dark, and the wool ready to come off. Between the layers of the muscles of those which swell thus rapidly exudes a bloody serum, which the housewives who are skilful in the preparation of braxy for table use endeavour to get rid of by putting the flesh in running water, and laying large stones on the top to press it out. And in regard to eating "braxy" (as the flesh of those who die of the disease is called), I would here remark that the practice is much to be reprobated, although it is almost universal among those connected with stock in every district where the disease is prevalent; and in some places of Argyllshire large quantities of it are salted, dried as hams, and sold into the towns, where by many it is considered as a delicacy. From the quantities of it consumed in particular localities, there is no doubt but that it is a cause of bowel disorders, impurity of the blood, and skin diseases.*

"*The Nature of Braxy.*—I consider braxy to be an acute inflammatory disease, which is excited in the digestive organs. Should this

* To such an extent is braxy mutton still in request, that while the skin of a blackfaced hogg last season brought two shillings in Ayrshire, the carcass brought four. This is about half value for the animal, which, without doubt, makes stock-farmers less careful about using means to stop its ravages.—ED.

definition of its nature be correct, the exciting causes must be sought for in the *nature* of the food, and its peculiar influence upon those that are liable to be attacked; and likewise in the *condition* of the pasture, and the influence and action of the atmosphere upon it, at the particular season when braxy is prevalent.

"*The general Character of the Land most subject to Braxy* is dry and light, composed of gravel and loose earth. In some situations the land is covered with heather interspersed with green patches or 'gairs,' while in others the surface is all or mostly green—'white land,' as it is called in the pastoral districts. There is very little braxy upon soils composed of peat-moss, or largely mixed with it; nor yet upon bog-land, either of deep clay or vegetable composition. For instance, the flat bog-land of Eskdalemuir is almost exempted from it. I was lately informed by a person who was for some time a shepherd upon a large farm in that district, that there was one season when they clipped all the hoggs that were smeared at the previous Martinmas. There is likewise very little of it upon the cold mossy lands of Ayrshire and the Upper Ward of Lanarkshire, nor yet upon the limestone districts of the English border. It is extensively prevalent in the West Highlands, particularly in some districts of Argyllshire. In the south, the dry hills of Peebles and Selkirk shires, with part of Dumfries and Galloway, are more particularly noted, although it does not prevail there to the same extent and severity as in Argyllshire.

"*Causes of Braxy.*—When the plants upon land, whether of heather or green herbage, are of a dry binding nature, and when the young shoots of the heather begin to get firm and woody after the decay of the blossom in autumn, they never fail to induce a costive habit of body, more especially among the younger part of the flock. *Constipation of the bowels is invariably present in braxy*, and they are thus, as it were, previously prepared for the unfavourable action of those other agencies which concur in exciting the disease. There is an inflammation of the digestive organs among hoggs upon arable land which bears a close resemblance to braxy; and where the bowels are not in a costive state at the time when the attack takes place, the disease, although evidently excited in the digestive organs, has more the appearance of general fever, and is evidently caused by irregularity of feeding, sudden changes of food, or by the foulness of the pasture.*

"Upon land where there is a large amount of surface covered with heather, which in spring and early summer becomes dry and gets out of season, the portions of green land are consequently

* It is evident that two diseases have been often confounded. Many of the exciting causes are the same in both. The subject is well worth the attention of our veterinary surgeons.—Ed.

eaten very close, and these being likewise the places to which the flock resort during the night, and where they leave a large quantity of manure, the grass upon them is kept in a soft and growing state so long as fresh weather continues. The same feature appears upon white land, where there is a large proportion of 'fogged leas,' as they are called, or dry land bearing plants of a dry and harsh description. Independent of these causes, there is scattered throughout hill-pastures of almost all descriptions a portion of land bearing soft tathy grass, which at a certain crisis becomes dangerous, or otherwise, according as it is aided or counteracted in its tendency to produce disease by the nature of the pasture with which it is intermixed, and the habit of body which has previously been induced. Uncultivated land upon which cattle are pastured is in general liable to braxy, owing to the abundance of soft tathy grass which is raised by their manure; and the grazing of cattle during the summer upon the land set apart for wintering hoggs was evidently *one of the reasons* why they were so subject to it when kept separate from the older sheep, which at one time was a prevalent practice among store-farmers in the south of Scotland.

"Plants get more difficult of digestion after they are fully ripened and partially decayed, and do not go so rapidly through the stomachs and bowels as softer food; and hoggs, whose digestive organs are comparatively tender, are sure to be more readily influenced by such food; and the constipation and indigestion thus induced require only to be excited by a proportion of softer grass acted upon by the atmosphere, thereby increasing the indigestion and causing fermentation, until either acute inflammation of the digestive organs, or general fever, is fully developed. I consider these as the leading causes of the disease, and as the reasons why hoggs are its special victims.

"*The time in autumn when Braxy will make its first appearance* varies more than a month in different years, earlier or later as the soft grass begins to decay, and more especially when frosty nights occur early. I have seen it make its appearance during September in one season, while in the year following, upon the same farm, there were few cases before the first or second week of November. Frosty nights, with a white rime, followed either by a change to fresh or a bright sunshine during the day, is the kind of weather during which it frequently makes its first appearance. Still, I have seen it commence in good dry weather, but not until the soft grass began to decay. There is one circumstance to which I would wish to draw particular attention, as it is so far corroborative of the foregoing statements, which is, that it is always severe after a hot, dry summer, during which dry lands exposed to the sun have been burnt up, and upon which a soft after-growth arises in harvest. In these seasons, should

frost not set in, braxy is late in making its appearance. I remember the summer of 1826, and the great growth after harvest, and that braxy was late in making its attack, but it was severe when it came. I give a short extract from a letter written to me some time ago by a good observer residing in Annandale, and practically acquainted with the disease:—'The worst year that I ever saw for braxy was 1826. I was then on a light land farm. The hoggs died there in great numbers, until we removed them to low pasture, when the disease ceased, but not for some time after their removal.' The year 1826 would be an extreme one, as there has been no such season since for heat and continued drought; yet I have always noted that after a dry summer braxy is sure to be more severe upon the dry lands that are usually subject to it, and likewise extends to places which in other seasons are nearly altogether exempted. This was particularly exemplified after several of the dry summers that occurred between 1847 and 1852. Heavy stocking aggravates braxy in much the same way. The land is closely eaten and kept bare during the summer, and after the lambs or other stock are sent to market and the land lightened, there is always an autumn growth which becomes foul and unwholesome."

Mr Borthwick cites some instances which corroborate the above views. He writes:—"The summer of 1842 was dry and warm. Sheep-pasture on hard land, exposed to the sun, was considerably burnt up. Rain began to fall in September, consequently a rapid growth followed. On a stock-farm in Peeblesshire, celebrated for its soundness—so much so, that for several years I have seen clipped, in the month of July, all the hoggs that were kept the preceding month of August—braxy broke out in October 1842, and so fatal was it, that out of six scores of hoggs, kept for stock, forty fell in a few weeks before any means were taken to arrest its progress. In following years no braxy has occurred, at least to any extent. This is particularly the case on arable pasture, on ground that has been heavily stocked during the summer, and then allowed to clean. A second or fresh springing takes place, and nothing is more dangerous for hoggs, or more certain to bring on braxy. I have never known it occur to any extent on young arable pasture while sheep had a fresh clean bite, if not previously overstocked, and allowed to clean. Thus it is quite evident that pasture, either of too dry a nature or too soft, is alike dangerous for braxy. Besides, any sudden atmospheric change, of whatever nature, has a great tendency to aggravate the disease."

Mr Cowan remarks as to *the time the disease annually abates or disappears*:—"The time when braxy ceases varies as much as that when it commences, seeming to be largely influenced by the periods of growth. It sometimes nearly ceases by the middle of December, and often entirely so by the end of it; while, in other

and more open seasons, individual cases will occur until the end of February. There are other causes of braxy which it is unnecessary to enumerate or reiterate. I may add, however, that there are causes arising from management as well as those which I have mentioned, which tend to aggravate (I might almost say create) and excite into activity any latent causes of disease that may exist, however feebly, in the soil. To give a single example: In all districts subject to braxy, the most of land set apart for hogg hirsels (hogg-fences, as they were called) invariably got worse for the disease the longer that it was kept separate for that purpose, and this formed one reason why some gave up the practice long before it fell into general desuetude. Upon a large farm in Dumfriesshire, where this plan was persisted in for many years, after all around had abandoned it, the loss ultimately reached as high as the one half of the flock annually. The place was at length stocked with ewes, and the hoggs allowed to follow unweaned; and the result of the change was, that for some years afterwards the deaths did not average above from 10 to 15 per cent.

"In regard to smearing, I have heard it affirmed by a great many individuals practically acquainted with the subject, that heavy smearing never fails to increase braxy. I would consider this as owing to the fever and disorder which the tar induces. Hoggs are very dull and listless for some time after being smeared with tar, more especially if heavy smeared; and when they die of braxy within a short time after the operation, the flesh tastes so strongly of tar *as to render it unfit to be eaten until it has hung for some months in the smoke.* When the skin is taken off, every shed or opening in the wool where the tar has been laid on, is as distinctly visible upon the flesh as the stripes upon a piece of printed calico. Independent of braxy altogether, heavy smearing is very injurious to hoggs in a variety of ways."

As to the Prevalence of the Disease, Mr Cowan remarks:—"It is very difficult to obtain a knowledge of the annual loss from braxy upon particular farms, or within a given district. I never was engaged upon what may be called a "sickrife" farm, at least in comparison with others. The greatest number of deaths from braxy alone that has occurred under my own eye, in seasons when it was considered severe, would not exceed 15 or 20 per cent; while, at the same time, upon farms in the same district that were more severely scourged, 20 and 25 per cent was held as only a moderate loss. Upon a large hill-farm in Selkirkshire, where the disease may be said to be present and little more, the mean annual loss for the last thirty years has been 1½ per score, or nearly 8 per cent. Upon some farms on Tweedside, where it was severe before preventive means were adopted, the loss was not much less in some seasons than from 30 to 35 per cent. While, as regards

the West Highlands, I have it from undoubted authority, that upon lands where the hoggs are wintered at home, and where a portion of older sheep die of braxy, the annual loss will range from 30 to 40 per cent; while in Morven it is sometimes as high as 45 and 50, as a good number of older sheep die in Argyllshire, especially upon land where cattle are kept. So severe are the losses in some parts of that country, that I have heard several persons affirm that they could not estimate what the deaths would amount to if they kept their hoggs at home during the winter, especially the wether hoggs.

"The expense of sending away the hoggs to a distance to winter, or else incur such severe losses at home, deducts largely from the profits of a stock-farm; while in the latter case the quality of the stock is much reduced by the loss of so many of the best hoggs annually, besides causing irregularity in the number of the respective ages upon the farm; as, when the deaths have been numerous, a greater number of lambs (and part of these, of necessity, small ones) are required to keep up the stock, and thus an additional quantity of hoggs are again exposed to the disease; while the draught of ewes or cast of wethers varies in numbers according as braxy had been deadly or otherwise in the particular season when they were hoggs."

As to Prevention of the Disease, Mr Cowan says:—"In giving details of any particular means that have been put in operation for the prevention of braxy, or that may be tried with some chance of success, I will first mention those that are available in the present circumstances of a farm, without any extra appliance beyond some slight changes of general management.

"The first and one of the best preventives is to stock moderately. Some kinds of land grow coarser and wilder when light stocked, and within a short time the stock show little improvement. But this is seldom the case with land upon which braxy is prevalent, as, independent of this disease altogether, it is otherwise decidedly more profitable. The stock become heavier, carry more wool, and are less liable to other diseases as well as braxy. I have one particular instance before me which may serve as an example. Upon a farm in Selkirkshire, adjoining one where I once was, there is a small detached hill, which at that time was stocked with thirteen scores of sheep. Disease prevailed upon it to a great extent, more especially louping-ill and braxy. The latter used to be severe when there were few or no cases upon other parts of the farm. The stock upon it was ultimately reduced to nine and a-half scores, and it has been for some time the healthiest part of the farm, braxy being almost unknown. This result was gradual, and not until several years after the reduction of the stock, clearly indicating that the land had taken some time to recover from the injury which it had previously received. Braxy has decreased considerably of

late years upon several farms in the vale of Tweed; and when making inquiries if any well-ascertained reasons could be given for this decrease, I was always answered—'That if it was not owing to their being lighter stocked, there was no other obvious reason.'

"When dry light land is heavily stocked, the finer portions are kept both foul and bare, and consequently a soft unwholesome growth arises at all seasons when the weather is open and mild. This is ever ready to excite the various diseases common to the particular season.

"Another preventive of braxy is regular herding, giving the flock a proper range of pasture, whereby they will obtain a greater variety of food. The very time when braxy commences, and during most of the season when it is most virulent, is the period when hill-stock, especially hoggs, are contented to take the least possible range. Their food is (at least comparatively) abundant, and easily procured within a limited range. In harvest and early winter, sheep have a strong inclination to pasture upon the drier land, more especially where it has a southern exposure. This is the very time when that costiveness is induced which I have already mentioned as a condition of braxy; and a variety of food at this particular season is necessary, in order to prevent that extreme constipation of the bowels which is produced by want of exercise, and the feeding too much upon one description of food. It used to be generally remarked that more hoggs died during the *smearing-time*, as it was called, when the shepherds were all employed at that operation, than during any other period.

"Another means of prevention which has been tried with success, is to allow the lambs kept for stock (with the exception of those upon draught ewes) to follow their mothers unweaned. Speaned hoggs are decidedly more dull, and apt to collect into small companies, and do not take the same range of pasture as those that are following their dams; and it is the general testimony of all who have paid attention to this matter, that a larger proportion of them die of braxy; and the case seldom fails to be greatly aggravated when a large number are kept by themselves, as has been often exemplified upon land where the disease was even otherwise very moderate. It is objected against allowing lambs to follow unweaned, that the ewes are thereby reduced, and kept in lower condition. But, on the other hand, the hoggs are better, and live better. Besides, it is doubtful if there is any great difference in spring between ewes whose lambs were weaned, and those whom they were allowed to follow until they dropt off of their own accord. It is often surprising to see how little difference in condition there is between them, especially when the winter has been moderate; and the one is again in lamb as early as the other.

"*Burning of heather* is a very simple, and yet far from ineffectual, means of mitigating or even preventing braxy, as well as other

diseases. Old heather is not only comparatively useless, but upon some soils positively hurtful, being dry and bitter, and possessing astringent properties, while any green land that may be mixed with it is kept in such a bare and foul state by the stock being so much dependent upon it at certain times, that there is no wonder that such farms (in certain localities) should invariably get the character of being "sickrife." Young heather is very feeding, and puts on a firm fat, while, like young grass, it is slightly laxative, especially upon moss-land; and where there is a part of moss-land upon a farm where the heather can be regularly burned, it in a manner gives access to a kind of land upon which there is very little braxy, and helps to afford that variety of food which upon some land appears to be essential in maintaining stock in a healthy state.

"Burning heather answers the same purpose as light-stocking, and far more efficiently, as, where the heather is not allowed to be burnt in any quantity, no amount of reduction in the numbers of the stock will counteract the unhealthy tendency which they acquire when confined to pasture upon old heather, and any green land that may be scattered amongst it. And wherever such a radical evil as the preserving of large tracks of old heather is allowed to exist, the consequences are sufficient to neutralise whatever schemes may be put in operation, either to improve the quality or promote the health of a stock.

"Upon land *peculiarly subject* to braxy, not any one, nor all of those means mentioned as preventives, will go much farther than to mitigate the evil. When hoggs are wintered off the farm, the disease is often allowed to commence before that they are removed to the winter-grazing. To prevent the great loss that so frequently occurs when hoggs are changed to arable land or turnips, *make the change early, and before the disease begins on the hill.* In this consists the main element of success—I might almost say the grand secret of the whole matter. As an illustration, take a lot of hoggs from off hill-land (where they are subject to braxy) early in autumn, and put them for a day or two upon cow-pastures, or meadows that have been dunged or irrigated—places decidedly dangerous—and it is rare that there is any loss. This fact is often exhibited in the case of lambs taken to a market late in the season, and in various other ways where they have to be confined in such places. But should this be done in the month of November, or any time after they have begun to die on the hill, they will then fall thick as leaves, as I have seen exemplified when they were brought into parks and meadows for the convenience of getting them bathed or smeared, and keeping them separate for a day or two from the rest of the flock. They are prepared for the disease before being removed from the hill, and the soft and richer grass speedily causes an acute indigestion, and develops it; and a considerable loss is often incurred by being too late in making the change, which is sometimes in-

creased when they are taken direct from the hill-pasture and confined upon turnips, the green tops of which, after the frost has begun to affect them, act in much the same manner as soft grass, which, joined to the hunger which they will oftentimes endure before beginning to eat them, has in many instances caused a heavier loss than would in all probability have taken place upon the hill.

"Instead of sketching out any plan to be pursued in this matter, and speculating upon what might, would, or should be the probable results, I shall give in his own words the practical experience of a gentleman in Peeblesshire, as communicated by letter some time ago:—'The best plan for preventing braxy among hoggs that I have tried, is putting them upon turnips; and the method I have found most successful, is to do so before the disease has begun among them. I therefore bring them from the hill before they begin to die (which in general is about the end of October), into the parks, and let them pasture a week or ten days upon clover grass, young grass among stubble, or second clover after hay. By this means the change of food is not so great, and it accustoms them to confinement, and when put upon turnips they settle better, and begin to eat them sooner. Since I adopted this system, I have lost very few hoggs in learning to eat turnips. In the course of a month, when perfectly accustomed with them, they are turned out to the hill every afternoon, and brought in to the turnips every morning, for three or four hours, which is continued all winter, and out of 400 hoggs I have very little loss. I likewise find that they thrive well on the hill after such treatment. I invariably put a few old sheep amongst them, when first put upon turnips, which helps them to break them sooner, and causes them to go over the field more regularly.' *

"I may mention that the hill-land upon this farm was at one time so notorious for braxy, when the hoggs used to be wintered upon it, that it was called 'a grave for hoggs;' and the complete success of the plan which this farmer has pursued for a number of years, affords as good an instance and as clear a detail of successful prevention as could be desired, besides furnishing another example of the benefit (I might say the necessity) of having more land cultivated in what may be called 'the purely pastoral districts.'

"In different districts of the West Highlands it has been customary to send the hoggs northward, to Inverness and Ross shires, to eat turnips; while others send them south (more especially the ewe hoggs) to Bute, Ayrshire, and Clydesdale, to winter upon hill or moor pasture, sometimes supplemented by a run of the arable land. But owing to the extension of draining, and the reclama-

* The preceding observations bearing upon removing hoggs early from the hill, are particularly worthy of attention, and are amply borne out in our own experience. They should be accustomed to the richer pasture before the frosts set in.—ED.

tion of such land when lying in a low situation, such places are gradually diminishing in number, and consequently more difficult to get; and there is an increasing demand for turnips, more especially for wether hoggs, as the objections that are made against wintering hoggs upon turnips do not apply to them in the same degree as to ewes. The first of these objections is, 'that they destroy their mouths by injuring the gums when they are tender, and thereby causing them to lose their teeth at an early age.' Now, as wethers are cast at three years old, they are not liable to be affected to such an extent as ewes, which are often kept to more than double that age. Another objection to turnips is, 'that they (the hoggs) *look* for them again the next year, and are more ready to fall off in condition than hoggs wintered upon pasture alone.'* There is part of truth in both of these objections. But out of two or more evils the least has to be chosen, and the question, in the first place, is between losing the hoggs by braxy, or else encountering some drawbacks by wintering upon turnips. Where there is arable land upon a stock-farm, and the hoggs can be wintered at home, they may be so managed as to lessen, if not altogether to do away with, any objections that may be urged against wintering upon turnips. Where it may not be convenient to turn them out each day to the hill, hay might be supplied, or else a run of the grass fields, conveniences which often cannot be had when they have to be removed to a distance.

"I was lately informed regarding the particulars of a case of successful wintering upon pasture alone during a period of seven successive years. The hoggs were taken from a farm at the head of Loch Eck, in Cowal, where the disease was so virulent that to all appearance the half of them would have died if wintered at home, as out of a part that were annually left upon the higher grounds where the disease was less severe, and a part dispersed throughout the farm that had escaped when the others were collected, at least nearly one-half died. The land to which they were removed was in the parish of Largs in Ayrshire, land to appearance as likely for braxy as that from whence they were removed. Here braxy was almost unknown. The land was upon red sandstone, and the pasture a mixture of young heather and fine dry green land, with a part of bent and coarse grass upon moss. They likewise got a run of the young grass upon the arable land. In some seasons there was a loss of one per score, and this always occurred when they were late in being removed. The gentleman who occupies the farm, and has now a stock upon it, informed me that he had not a single case last year, while upon the adjoining

* In some districts, giving turnips to wether hoggs is objected to on the ground that the animals are more liable next autumn and winter to braxy. Indeed, for hill stock, turnips should be given in sparing quantities.—ED.

farm, where the land is all upon the whinstone, there was a considerable loss. The land at the head of Loch Eck was likewise upon the whinstone. Land upon the primitive rocks is invariably the more deadly, there being rarely such a thing as braxy upon land in what is called 'the mineral districts.'

"In different parts of Dumfriesshire braxy has greatlydiminished where patches of land in proper situations, and suitable for the purpose, have been broken up, limed, and laid down with grass, and again thrown out to the hill-pasture. In this manner large tracts of lea land overrun with moss, and of little value, have been rendered profitable, producing a marked improvement upon both the health and quality of the stock, in some instances reducing the annual loss to little more than 5 per cent.

"It may be asserted that wherever cultivation has been extended, braxy has diminished. Where the means of wintering hoggs at home can be attained, either by a small enlargement of the land already in cultivation, or by the breaking-up of a considerable tract of that which in an uncultivated state is of comparatively little value, it should never be neglected. There is, in the first place, a saving of expense, while the arable land is enriched, and the hoggs, when kept at home, can be managed in such a way by being turned out daily to the hill—getting hay, or a little corn, so as to be wintered upon less than one-half of the turnips which they would otherwise require if removed to a purely agricultural part of the country. In this way may the objections usually urged against turnips for hoggs be partly if not altogether set aside."

In regard to preventives, Mr Borthwick makes some good observations:—

"I consider clover, or rye-grass hay, or even meadow along with a few turnips or rape-cake, the best preventives. Hay ought to form the principal part for keeping stock for hill-pasture. That it is more effectual for the prevention of braxy and several other diseases, the following facts will show: In 1855, on a stock-farm in Peeblesshire, where braxy and louping-ill prevail, and where twelve score of hoggs were kept, hay was tried along with a few turnips, and not a single case of braxy occurred: when the hoggs were turned to the grass in the month of April, their teeth were in good condition; whereas, in former years, when turnips alone were given, the loss was more or less from braxy, and the teeth much broken out. The year following, the experiment was tried with equal success, and not a single case occurred. Symptoms of louping-ill began to show in the month of February: blame was attached to the state of the pasture, the hoggs being enclosed in a young lea-field, which ought never to be done, as the richer the soil it is the more dangerous, as a rise of soft watery grass is more apt to take place whenever a few fresh days may occur, and which, as already stated, is little else than poison for hoggs. The hoggs

were removed into a ploughed field, well-watered, where no vegetation could be had, and regularly supplied with hay put into sheep-hecks, with an addition of a quarter of a pound of rapecake per sheep, which had the desired effect: not a single fresh case occurred." *

Cure of Braxy.—Mr Cowan observes: "If the cures have been few, it must be acknowledged that the chances of successful treatment that are presented are few also. The flock is spread over an extensive surface, and where the hoggs are mingled with the older sheep, cannot, in ordinary circumstances, be looked over more than twice a-day, and in numerous situations only once. And as the disease is prevalent when the days are short and the nights long, a wide interval must necessarily elapse between the evening and morning inspections, even in cases where the hoggs are kept by themselves within very limited bounds. Upon extensive hill-farms the greater proportion are found dead, without having been observed to be sick. Another part are too far gone before being noticed to admit of any applications being attempted; and it is in the case of a small number only that there is a chance of success held out by applying remedies as promptly as possible. Bleeding and purgatives are the only remedies that I have ever seen tried with success, and it is oftentimes very difficult either to draw blood so rapidly and in such a quantity as to make the operation effective, or yet to move the bowels, owing to the constipated state that they are usually in. As all those affected, whom it is desirable to treat, should be put under cover (it being of the utmost consequence to afford shelter), the driving them from the hill will in general greatly facilitate the bleeding.

"There is a very great difference in the land for affording a chance of cure, as in some localities, where it is exceedingly virulent, a case of cure is rarely heard of. In a letter from a friend in Morven, he remarks: 'I used to cure hoggs affected with braxy when in Caddon Water (a tributary of the Tweed), but I have not cured one since I came here.' I have noted that more cures were effected after the end of November than previously, as the inflammation seemed to be more violent early in the season."

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* The use of rape-cake for hoggs is certainly well worthy of a more general trial. To us it has always appeared that braxy bears a strong resemblance to "black spauld" in cattle. That disease, like braxy, used to attack the best-conditioned animals. Oil-cake, given to young cattle, has been the means of almost eradicating this malady. Rape-cake seems to have the effect of maintaining the healthy action of the stomach and the bowels, which are evidently the organs first affected in braxy.—ED.

ON THE REARING OF CALVES.

Communicated by Thomas Strangeways, V. S., Lecturer on Anatomy and Physiology, &c., Edinburgh Veterinary College.

On no class of animals has domestication entailed more diseases than upon those of the bovine tribe, and in none is the average of deaths so high in the young. And is this to be wondered at, when we consider that, whilst the foal, the lamb, &c., are, comparatively speaking, allowed to remain in a state of nature, sucking their own dams, having liberty to run and caper about at pleasure, either in the fields, on the moors, or on the hill-sides, breathing the pure air of heaven—and thus, although exposed to all the vicissitudes of a variable clime, gaining health and strength, and protesting by their activity and vigour against the mistaken sympathy man is apt to extend to their apparently unprotected and exposed condition—the poor calf is, in the majority of cases, as soon as dropped, removed to some close pent-up house, and there gorged or starved according to the caprice of its human nurse? There are various modes of rearing calves. The first, and most natural one, is that adopted in rearing well-bred stock—viz. by allowing the calf to suck its dam until twelve months old. The second plan, and one frequently adopted in country dairies, is to allow the cow to suckle her young for a few days, when it is weaned and brought up by the hand. A third plan is one I have seen followed by the cottars in Islay; that is, to allow the calf to follow its dam, but to prevent its sucking her, excepting at intervals. In order to effect this, a piece of leather, provided with iron spikes in front, is tied round its nose, this instrument being only removed at milking time, when, during the interval the milkmaid is drawing the milk from the teats on one side, the calf is filling its belly at the same time from the other. The last plan, and the great source of disease, is that generally adopted in dairies in or near large towns, where, owing to the necessity of having a constant supply of new milk, the calf is removed as soon as born, and may be truly said to be a fosterling from its birth, not even being allowed to draw from its mother's teats the beestings, or that first milk (colostrum) which, containing a peculiar aperient principle, is evidently intended by nature to remove the effete or fœcal matter (mecomium) that has accumulated in its intestines during the latter months of intra-uterine life. After its removal, probably into some close confined place, where it has barely sufficient room to lie down and rise up again, and where pure air is as carefully excluded as if it were a deadly poison, instead of being allowed to follow its own unerring natural instinct of sucking when it pleases, it is fed at rare intervals, generally twice a-day, getting from four to six quarts at a time, and

that as fast as deglutition will permit. Still further, the milk is often deprived of one of its principal constituents, the cream, the oily or fatty matters, being that portion destined in a great measure to keep up the animal heat and support the process of respiration. Again, the skim milk which is substituted, in order to make it appear like milk fresh drawn, is heated, the only thermometer used to test the temperature being the finger of the maid, whose thick cuticle, being by no means very sensible to the impressions of heat, is a most unsafe test to detect whether the milk may not be heated many degrees higher than is consistent with safety; and thus evil is produced. That those modes of feeding and housing calves are fruitful causes of disease, all who have had any experience in the rearing of calves will readily, I feel assured, confirm my statement. When we hear or read of thousands of calves dying annually from such mismanagement, it is high time the veterinary surgeon should put his shoulder to the wheel, and do all that lies in his power to prevent such wholesale destruction. In this, as in every other case, prevention is better, and indeed much easier, than cure; and it is the bounden duty of the professional man—and I especially would address my remarks to those who have the honour of holding the veterinary diploma of the Highland and Agricultural Society of Scotland, on the ground that the principal "end and aim" of that Society is the furtherance of the interests of agricultural stock, in which the great majority of its members are so directly and largely interested, in their respective capacities of landlords, tenants, and graziers—I repeat, the veterinary surgeon would but half discharge his duty if he neglected to urge upon the feeder and grazier the necessity of paying more attention to the feeding and housing of his young stock. If, instead of gorging them with milk twice a-day, he will be at a little extra expense in having them fed five or six times a-day, he will be speedily and amply remunerated; and instead of "cribbing and confining" them in close pent-up houses, if he place them in loose sheds with open yards to romp in, he would find himself eventually a gainer, by saving numerous lives that would otherwise be lost; for let him rest assured, there is no period in the rearing of stock where mistaken economy so completely defeats its object as in the mismanagement displayed in the rearing of calves after such a fashion; for not only is bad feeding an immediate cause of such diseases as scour and the like, but it is also one which, by retarding the growth of the animal, and producing debility and emaciation, lays the foundation of diseases which attack the animal as it approaches maturity. Again, the grazier will always find that those calves which have been neglected during the period of their growth, will always, when put up to fatten, require not only longer time for the profitable development of their condition, but that they also consume a greater quantity of food. For example, if the state of the well-bred stock in

our country, that have been properly fed and carefully attended to from their birth, be compared with that of the half-bred Irish stock brought into this country to graze, it will invariably be found, that the former will be ready for the market in a very short time, and at a comparatively trifling cost, while the latter require not only a long time to fatten, but are at the same time very liable to such diseases as dysentery, red water, murrain, and the like, which the former are almost exempted from. The most common of the diseases affecting calves—depending on the system of mismanagement I have described, in housing and feeding—are scour, inflammation of the fourth stomach, and joint-evil. The causes, symptoms, and treatment, remedial and preventive, I shall briefly, and as devoid of technicalities as possible, bring before your readers, trusting my humble efforts will be the means of arresting the evils complained of, and of saving the lives of many valuable animals, and also of furthering the pecuniary interests of the agriculturist. I have been induced to lay before your readers this communication, that the subjects it embraces have of late excited in no small degree the attention of parties directly interested in the rearing of stock. Professor Dick has received numerous letters of consultation from professional men, as well as graziers and others, in different parts of Scotland, desirous of obtaining his opinions as to the causes and remedies of the diseases referred to, indicating the extent to which they prevail. I have been favoured with his valuable suggestions, drawn from personal knowledge and long experience, and have embodied them with the observations I had occasion to make myself when practising in one of the largest grazing districts in West Yorkshire (Wharfedale). My paper is in every sense a practical one, and seems the more to be called for, that systematic writers, and the various authors of treatises on the special diseases of cattle, make little or no reference in their published writings, so far as my research extends, to the subjects my attention has been directed to.

Before proceeding to notice the diseases, I think it advisable to make a few remarks on the food of the young, and the changes it undergoes during the process of digestion. Milk, containing as it does all the elements necessary for furnishing the materials both for the growth and nutrition of the body, and for the maintenance of its proper temperature, is undoubtedly the proper aliment for the young of all the mammalia. Milk contains a non-nitrogenous substance, cream-butter, which subserves for the respiratory process; sugar, also destitute of nitrogen, assisting the fat in the production of animal heat; and a nitrogenous substance, casein—cheese—which serves for the purposes both of nutrition and growth. When we find the due proportion of these two distinct principles or elements of nutrition and respiration is not kept up, the health of the animal suffers. In the young the powers of digestion are comparatively feeble; and if, by giving food deprived of its proportion

of carbonaceous matter, we either compel the digestive organs to eliminate from the elements of nutrition those necessary for respiration and for maintaining the natural temperature, or we draw them from the tissues of the body, in either case we do so at the expense of the healthy functions, producing wasting of the tissues —atrophy—indigestion, diarrhœa, and death. The colostrum, or first milk of an animal, contains not only an aperient principle, but also casein in a more easily assimilated form than subsequent milk. Casein is not only more assimilable during the early life of the young, but also in less quantity,—nature not only adapting the food to the feeble digestive powers of the young, but also, during the period when it is incapable of making exertion to keep up the animal heat, providing a greater amount of respiratory or carbonaceous elements. This plainly, I think, shows the absurdity of man's substituting for this milk one less nourishing, not only containing a greater amount of casein, but deprived of its fat or respiratory element. If stern necessity compels the substitution of skim for new-drawn milk, it is the duty of the feeder to provide for this deprivation of the carbonaceous element by adding to it some substance rich in fatty matter—the best, in my opinion, being decoction of linseed, which not only supplies the place of the fat withdrawn, but also acts as a gentle aperient. Milk, when taken into the stomach, undergoes certain changes: first, its casein becomes coagulated and separated from the whey by a catalytic action, produced by contact with the mucous membrane of the stomach; this coagulated casein or curd is, in a state of health, speedily redissolved by the gastric juice; then it passes into the duodenum, where is added to it the secretions of the liver and pancreas; these produce a chemical change, converting it into a fluid, which becomes absorbed by the lacteals, and then passes into the circulation. Should this milk be given in a form not adapted to the digestive powers of the animal, or in quantity to overload the weak stomach, the functions of that organ become impaired, the system becomes torpid, the liver becomes deranged, digestion suffers, and the health of the animal is materially affected. The animal retains, to a certain extent, its appetite—drinks its milk, which curdles in the stomach; but the secretion of gastric juice being suspended, the curd either remains undissolved, forming in the stomach a hardened mass, the whey passing off by the intestines as a whitish fluid, or the curd passes unchanged into the intestines, there sets up irritation and excites diarrhœa, the fæces being passed as a white fluid, in which float masses of the curd. Again, should the milk be given hot, it irritates and inflames the delicate mucous membrane of the stomach, where it remains undigested in a curdled state, adding fresh fuel to the flame, while the brain becomes sympathetically affected as well as the liver, and all the evils of inflammation of such a delicate organ follow as a natural consequence.

The first and most common of the diseases depending upon mismanagement in the feeding of calves to which I have alluded is, white scour or skit, sometimes, but erroneously, called gastro-enteritis. Scour is a peculiar form of diarrhœa, induced by indigestion, and depending upon the milk on which they have been fed not being of a nature appropriate to the delicate structure of their stomach during early life, as already noticed. The disease, although mostly seen in hand-fed calves, is occasionally met with in those sucking their dams. When it occurs in sucking calves, it is brought about by acidity of the milk. Milk of cows in perfect health and at grass always presents an alkaline reaction, whereas the milk of cows confined or stall-fed almost invariably assumes an acid property, which fact is sufficient to account for calves sucking stall-fed cows being in no better position than those fed from the pail. In sucking calves, scour generally makes its appearance from the third to the fifth day after birth; in hand-fed ones usually a little later, and in them it may occur at any time during which the animal is fed exclusively on milk. The symptoms of scour are,—appetite either ravenous or capricious, great dulness, disinclination to be moved, flatulence, abdominal pains, pawing with the feet, liquid evacuations of a pale yellow colour, often very offensive, and sometimes containing shreds of curdled milk, which have passed unchanged through the intestines. These are accompanied by heaving of the flanks, wasting of the flesh, and eventually death from inanition. The remedial treatment consists in the administration of alkaline carbonates, to counteract the undue acidity of the gastric secretion, —either carb. magnesia or soda, or even common chalk, combined with some aromatic stimulant, as ginger. As the liver is almost invariably in a torpid state, mercurials will be found of service. The following formula is one I have found very useful in scour: Hydrargum c̄ Cretæ, from grs. 10 to 15, with 2 drachms of powdered rhubarb, given twice a-day; and should the abdominal pains be very great, it would be found advisable to add 3 grs. powdered opium, at the same time keeping the animal comfortable, and giving its milk in small quantities and at short intervals. The best plan of preventing this disease would be to allow if possible new milk, more particularly for the first few days after birth; if new milk is not to be had, then equal quantities of milk and decoction of linseed given five or six times a-day, and little at a time,—allowing the animals room to romp about and breathe the fresh air. Should the milk possess acid properties, lime water, added in sufficient quantities to give a slight alkaline reaction, would be found of the greatest service. This disease is raging to some extent amongst the lambs in some districts; and in them I have no doubt it is caused by acidity of their mother's milk. In lambs it must be treated in a similar manner as in calves; that is, giving alkaline carbonates. As it is, however, a difficult thing to attend to a number of lambs, I would advise giving oil-cake, or good succulent food, to the ewes, and

removing them from the pastures—which, where this disease occurs, are generally damp, undrained ones—to dry, sheltered ones.

The second disease to which I have already alluded is gastritis, or inflammation of the fourth or true digestive stomach, sometimes called abomasumitis. This is a disease frequently met with in districts where calves are hand-reared, and is in almost every instance produced by giving milk that has been heated much above the natural temperature of the mother's milk, or milk that has had added to it steamed or stoved oil-cake, or boiled linseed,—all of which, by being given too hot, I have seen produce the disease. Gastritis sometimes, although rarely, occurs in calves that are sucking their dams, and in these cases is produced by the cows being fed on bad food, or in pastures where some noxious plants grow, the milk taking up some of the active principles of the plant. The disease is, as its name implies, inflammation of the abomasum, accompanied by head symptoms. The symptoms of it are very urgent, and, when once seen, not easily forgotten. From five to twenty minutes after feeding, the animal gets restless, and its breathing becomes accelerated; abdominal pains supervene, shown by the animal striking its belly with its hind feet; it groans heavily, and is restless in every position, falling down and suddenly rising up again; in addition to grinding of the teeth, the animal becomes convulsed, foams at the mouth, has a peculiar twitching of the muscles, partially loses its sight, and becomes prostrate. These symptoms will last from ten to twenty minutes, and either pass off, to recur at the next time of feeding, or they increase in intensity, when the animal tumbles over and dies. In cases not proving immediately fatal, after several recurrences, other symptoms, such as diarrhœa, and finally dysentery, make their appearance, and put an end to the poor animal's sufferings. The treatment consists in giving a gentle laxative and allowing, if possible, the calf to suck its dam; but as this, in ninety-nine cases out of a hundred, is altogether out of the question, then milk must be mixed with an equal quantity of decoction of linseed, and given cool, to insure which a thermometer should at all times be employed,—the natural temperature of milk being about 90° Fahrenheit. The linseed, in this as well as the preceding disease, appears to be the best prophylactic, acting both as a nutrient and demulcent, also as a mild laxative. If diarrhœa sets in, prepared chalk should be given with P. Tormentilla root.

On making a *post-mortem* examination in these cases, we find the fourth stomach inflamed and the liver congested, gall bladder full, brain also in a congested state, but the other viscera are all healthy. On the 6th of this month Professor Dick was consulted respecting certain cases in the neighbourhood of Elgin, which, from the symptoms sent, and from a *post-mortem* examination I made on one sent to the College, I have no doubt were cases of gastritis.

The third disease, to which I have already referred, and to which

calves are liable, is one which has received a great variety of names; but the most common, and by which it is best known in this country, is that of joint-ill or joint-evil. This disease is also very prevalent amongst lambs, the causes, however, differing very widely in the two classes of animals. In calves, the most common cause is the animals' being closely confined, in numbers together, in cold, damp places, or in places that are offensive from the dung and urine being allowed to accumulate and ferment, assisted materially by irregular feeding; in addition, most of these calf-houses being badly ventilated and very insufficiently lighted. In fact, the majority of cases of joint-ill in calves proceeds from, and depends upon, gross mismanagement. In lambs, it occurs most frequently in springs when the snow lies late on the ground and the herbage is scant,—the ewes becoming poor, with but a short supply of milk; or it occurs in damp pastures, and during cloudy weather. It is common in some seasons on those hill-farms exposed to damp east winds. The production of joint-ill is thus connected with, and dependent upon, cold, combined with damp, and upon insufficient nutrition; in a few words, on the combined influences of those causes which have a tendency to depress the system. It consists in chronic inflammation of the joints, generally followed by ulceration of one or more parts of such joints. The symptoms are:—A swelling of one or more of the joints commences first, which is accompanied with great pain, heat, and lameness. The swelling generally first attacks the fetlock joint of one or both fore legs, then perhaps the knees, and, in bad cases, all the joints,—the swelling usually commencing at the lower joints and proceeding upwards. The attack is accompanied with a great amount of low fever; the appetite fails, and the animal becomes emaciated; heaving of the flanks supervene. As the disease advances, the skin about the joints sloughs, ulcers form, the ligaments and tendons become exposed, and, in bad cases, the synovial membrane itself ulcerates, and it, as well as the capsular ligament of the joint, gives way, and the synovia or joint-oil escapes. The swelling is occasioned in a great measure by an increase of fluid in the joint, which consists partly of joint-oil and partly of lymph. Treatment:—In lambs, if the affection be discovered in the earlier stages, give oil-cake and salt to the ewes, by which means both the quality and quantity of the milk will be increased; and the ewes must at the same time be removed to warm, sheltered places. In calves, the remedial treatment consists in the provision of good dry beds, a careful attention to cleanliness and ventilation, and the administration of good food frequently and in small quantities. Constant fomentations ought to be applied to the parts affected, or, as a substitute for fomentations, hand-rubbing. In cases where the animal becomes debilitated, tonic medicines may be tried. The best preventives are comfortable, well-ventilated sheds, not over-crowded —good food, moderate warmth, and an allowance of salt and chalk.

OLD AND REMARKABLE TREES IN SCOTLAND.

[NOTE BY EDITOR.—In consequence of representations by many influential members, the Directors resolved in 1858 to collect information regarding old and remarkable trees in Scotland, and they accordingly inserted in the Premium-Book of that year the following notice :—

OLD AND REMARKABLE TREES.

With the view of obtaining and publishing facts connected with the history, progress, and present condition of old and remarkable trees in Scotland, members of the Society, and others, are requested to communicate, in the subjoined form, whatever information they can afford.

The following trees may be reported on: Oak, Elm, Ash, Sycamore, Maple, Chestnut, Horse-Chestnut, Beech, Walnut, Hornbeam, Tulip-Tree, Locust-Tree (*Robinia*), Birch, Evergreen Oak, Yew, Scotch Fir, Silver Fir, Spruce Fir, Balm of Gilead, White Pine, Larch, Poplar, Willow, and other trees of old growth.

Column 2 will embrace height, girth, spread of branches, and, if possible, a calculation of the contents of timber.

Column 3 will state the age as nearly as can be ascertained, or inferred on reasonable grounds.

Column 6 will, in addition to elevation, describe the shelter.

Column 8 will state whether the tree is vigorous, increasing or decaying, and if it bears marks of having been pruned.

Column 9 will state the name of the farm or estate, and nearest post-town or railway station.

1. Name of Tree.	2. Size.	3. Age.	4. Soil.	5. Sub-soil.	6. Alti-tude.	7. Expo-sure.	8. Present Condi-tion.	9. Where Grow-ing.	10. General Remarks.

Copies of this notice and schedule were sent to the clergyman of every parish, with a request that they would take the necessary steps to procure the desired information. The notice was repeated in the Premium-Book for 1859 : reminders were sent to those gentlemen who had not reported, and applications were made to individual proprietors, factors, and foresters in various districts. The result has been that returns have been received from about 250 parishes ; and the Directors, believing that the inquiry has been nearly exhausted, are now prepared to lay the information they have obtained before the public, through the medium of the *Transactions*. At an early period, Mr Cosmo Innes kindly placed his services, in arranging and editing the returns, at the disposal of the Directors, and the following paper forms the first or preliminary number furnished by that gentleman, for whose valuable aid and co-operation the Directors feel deeply indebted.]

SOME ACCOUNT OF EARLY PLANTING IN SCOTLAND.

It is the common—it may be said, the universal—opinion among our countrymen, that of old, but still within the period of history, Scotland was a woody country. The *sylva Caledoniæ vastissima,* with its population of bears and wild cattle, may now be considered a myth, as old, to be sure, as Pliny, who liked to place his marvels in inaccessible situations. With later authors the difficulty has been where to find map-room for this boundless forest. Tradition points to vestiges of it in the Torwood, near Stirling, and to the fine oaks remaining on the heights of Cadyow, but nobody had ever seen it in actual growth and vigour. Not even Boece and his band of ready authorities pretended that in their day there was any great breadth of wood in Scotland.

All evidence of record is against the myth. Several things incidentally concur to prove the scarcity of wood: *e. g.*, the extraordinary care shown in the earliest charters in giving and reserving right to a small use of timber for building and fuel; the use of foreign timber, when required for any great building (Arbroath Abbey was built of Norway wood); both bow-staves and spear-shafts were always imported, the long straight timber not being procurable at home. It may be doubted whether even the geologist, who despises the little period of human history, finds evidence of continuous wood in any district of Scotland. The trees found in peat-mosses, for the most part few and small, and confined to a narrow space, are surely very far from proving that large tracts of country were covered with close forest.

One source of the common error is the change of meaning of our word *forest.* This could be proved by innumerable records. *Foresta,* signifying in early charter-language a chase or range for game, with peculiar privileges, did not originally imply a wooded district at all; and an old hunting baron, or a jolly abbot who loved a fat deer and got his green pastures and hills erected into a free forest, which gave him the right to punish the slayers of deer with the utmost penalties of the old Norman law, would have been much disgusted if it had been proposed to plant his chase from side to side. Now, however, the occurrence of the word *forest* in charters of lands all over Scotland —in the wilds of Rannoch, and the bare hills of the Ettrick border — is held to prove that the heather and grey lichen, nay, the very granite-tops of Breadalbane, as well as the green braes of Yarrow, were once a close dark wood. It seems that the result of a full examination of written evidence, with the proof afforded by the appearance of the ground, would be, that our country, as to *natural* wood, was never very different from its present state. There are, and always have been, districts more or less willing to send up a native growth of timber. We have now, as we always had, in the glens of

Mar—in the great valley of Glenmore, Abernethy, Rothiemurchus, and that part of Speyside—a very interesting, and, I believe, aboriginal pine forest—of *Pinus sylvestris* (Scotch fir), no matter whether living to its natural term or meeting with a violent death, still reproducing itself if not impeded, and indeed surmounting many impediments, and stretching up—not, as vainly imagined, to the tops of the mountain, but as high up the glen as wood can ever have grown—as high as soil and climate will allow. In that beautiful valley, where the Chisholms and the Frasers divide the land, it is quite within memory that a pine forest existed, so extensive and so difficult of access, that the poor cottars of the glens were allowed and encouraged to pay their rents by cutting down as much as they could carry out *on horseback*, and selling it in the market of Inverness. Similar fir forests existed within memory in Glenmoriston, and on one side of Loch Arkeg, in Locheil. To a passenger, a sportsman, a naturalist, or a mere idler or tourist, trying to steer his way through those fir forests of Spey, and Dee, and Beauly, they seem interminable—they fill up the idea of the *sylva Caledoniæ vastissima;* but when the bewildered wanderer gets "out of the wood" and studies the geography of his day's ramble, he is surprised to find so small a bit of the map devoted to them.

We shall not be very far from the truth then, in taking old historical Scotland—Scotland of the fourteenth and to the beginning of the eighteenth century—in respect of wood, to have been very much as at present; making allowance, however, for the effect of cultivation, which has curtailed it *a little*, and of plantation, which has *immensely* increased its quantity, especially in the last century. Speaking generally, of old the levels were either cultivated, or bare moorland or swamp; the upland pastures, whether green or heathery, were bare of wood, except where the steep and rough glens, ravines, and water-courses, sheltered and protected from cattle a fringe of native wood—hazel, birch, and oak—the latter of small size.

But while such is the result of all the evidence as to the general bareness of the country, it is equally clear that there has always been some wood—even timber—in Scotland. The attention of our antiquaries has been directed of late to those forts, or defensible dwellings, built in inland lakes and morasses, which the Irish have taught us to call *cranogues.* They are of great antiquity, perhaps the most ancient extant dwellings we have, except caves and burrows, and the progress of draining has in some instances laid open their anatomy. The *cranogue* is often built on piles of oak of moderate size, while the cross timber for coupling them is sometimes of birch, both well preserved in the mossy water. Along with them have been sometimes exposed to view the shell of a rude canoe, formed very clumsily, but of a single oak, and made from a tree of large girth.

Coming within the period of history again, we have a few facts recorded, which throw a little light on our subject.

We know that in the middle of the thirteenth century (A.D. 1249), the Earl of St Pol and Blois, preparing for the crusade, had a wonderful ship (*navis miranda*) built at Inverness. It is presumed to have been of Scotch pine.

A little later (in 1291) Alan, Bishop of Caithness, was engaged in putting a roof on his Cathedral of Dornoch, and wanted timber. We know that that district is not a wooded region now, and it appears to have borne the same character at that time. The bishop was a friend of Edward I., then carrying out his great scheme of absorbing Scotland. If there had been timber suitable for his purpose in his own wild diocese, he would certainly have sought it there. The great object *then* was to get the material near home, for roads were imperfect, and shipping along that difficult coast was a serious impediment. It was evidently not to be had in the northern peninsula, and the bishop obtained the grant from the nearest forest-land where such trees could be found. The king, setting forth* that for the souls of Alexander III. of good memory, King of Scots, and Margaret his queen (King Edward's sister), he had given to the bishop forty oaks fit for timber for the fabric of his Cathedral, grants precept to Alexander Comyn, keeper of the wood of Tarnway in Moray, to deliver such forty oaks from that wood—*in bosco predicto*—a term which corresponds singularly with the words used in a transaction three centuries later,† when James, Earl of Moray, sold "all the growing trees in our *buss* of Earlsmylne, betwix that and our hous and castle of Darneway."

The little valley of the Feuch, in Kincardineshire, where the kirk of Strachan stands, is rough but kindly dry soil, and at one period, on the bank facing the south (it may be all ploughed now), every here and there, behind a big rock, or in a rugged watercourse, dwarf oaks were struggling to get up; and no doubt they formed a good copse before high-roads and wheel-carriages made them worth cutting. The bishops of Brechin were lords there long ago, and they must have been in the habit of drawing from thence supplies of such small coppice wood; for, on 20th February 1435, when John, Bishop of Brechin, granted a lease for three lives to Alexander Irvine of Drum, of the Kirkdavoch of Strachan, he took him bound to deliver, not annually, but once only, as many of what are vulgarly called laths of oak ‡ as would suffice for the roofing of twenty perches of the Cathedral Church, or of the bishop's palace.

Although the presumption is that the oak-laths which formed part of the *reddendo* of that lease were to be paid from the land leased, it should not be overlooked that the grantee was laird of Drum, and that the bank of the Dee at Drum, which appears to have been a wood or chase in the reign of Robert Bruce, who

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* 1291, *Rot. Scot.*, p. 6. † 1641, *Kilravock*, p. 328, price 240 merks.
‡ "Tantas vulgariter dictas lathis bonas et sufficientes de quercu."

speaks of his "park" of Drum, continued to produce marketable timber several centuries later.

In 1606, Alexander Davidson, styled tymber-man in St Andrews, agrees with "the honest man that has bocht the wod of Drum, for als mekill tymber as will big ane bark."* The timber was to be floated down the Dee, "how soon the water growis"—from which it may be inferred that it was fir and not hardwood, and the bark was to be built at Aberdeen, very near to where the Northern Railway station now is.

In 1612-13 nine trees were bought from the "wod-men of Drum," to make a sluice for one of the town of Aberdeen's mills, for the price of £27.† These may have been oak. But whatever the timber was, this wood of Drum, those oak-laths of Strachan, the oaks of Darnaway, and the pines of the Highland glens, were of no man's planting.

Something is to be learnt of the early state of our country from those codes of (customary) law which, though of uncertain date, were assuredly prior to any parliamentary legislation.

In the ancient form of Scotch criminal procedure, known as the "Iter Justiciariæ," among the delinquents to be inquired after by the great justiciar are "peelaris of grene wod," and also "grene wod stelaris, closoures-brekaris, and stelaris of tree or froit."

When James I. returned from his English captivity, his eye, so long accustomed to look from his prison-towers over the oaks of Windsor and Runnymede, recognised at once the bareness of his own kingdom. But indeed our parliaments began at that time to show a great anxiety to encourage rural improvement of all kinds, and to reform the miserable state of the country, exhausted and barbarised by a century of civil war and misgovernment. They were not versed in political economy, it is true, but they saw a hideous evil and wished to remedy it.

It was in this spirit that, in 1426, an act was passed which ordained that "everilk lord, havand land beyond the Month, big and repair their castles and manours, and dwell in them, for the gracious governaill of their lands be gude policie, and to expend the fruit of their lands in the cuntrie."

So, also, it had been enacted, in 1424, that barkers of trees be fined 40s. to the king; and that wood-stealers should suffer law in the court of the lord whose wood was stolen (where doubtless they would have ample justice). But parliament aimed at something more than such repression of wood offences. It ordained‡ that all crown vassals (that is, the great lords of the soil) should, at the Whitsunday set of their lands, bargain with their tenants to plant wood and make hedgerows and to sow broom in places convenient, in proportion to the extent of their mailing. This sowing of broom looks like a despairing effort to procure something for fuel.

* Aberdeen Town Registers, p. 280. † Spalding Misc., v. 157. ‡ Jac. ii. 1457.

The act was not without some effect. Sixteen years later we are enabled to assist at a term-day of the great Cistercian Abbey of Coupar-Angus.* On the 10th November 1473 the abbot sets in lease to seven tenants, who are bound to keep good neighbourhood, the Abbey-lands of Balmyle for ten chalders of victual (half bear, half oatmeal) yearly, a chalder of horse-corn, six dozen of capons, six dozen of common poultry, and certain carriages; and then we have this compact—"The tenants sall put al the land to al possibil policie in biggin of housis, plantacioun of treis—*eschis*, *osaris*, and *sauch* and froit-treis—gif thei ma." The tenants have other obligations, such as keeping the land free of "guld." The osiers and saughs may have been to supply the industrious basket-maker, or they may have been suited to the swampy land. They were recommended too, like the broom, by their quick growth.

But these efforts of the legislature and of the great land-holders quite failed in the desired effect. In 1503, in the reign of James IV.—upon the lamentable narrative that "the wood of Scotland is utterly destroyed"—penalties against depredations are increased; the fine for selling or burning green wood (though your own?) is ordained to be £5; and every lord and laird is enjoined to make deer-parks, stanks, *coningaris* (they had not experienced what deadly enemies they were rearing to young wood), dovecots, orchards, and hedges in their policies; and where there are no great woods nor forests, to plant at least an acre of wood.

Persevering in its efforts, parliament again, in 1535, in the reign of James V., re-enacted the old acts for planting trees and *sowing broom*, and further ordained that every man having a hundred-pound land of new extent, where there are no woods or forests, plant wood and make hedges and haining for himself, up to three acres of land, and so in proportion to his heritage; and that every laird of one hundred-pound land, cause his tenants to plant *a tree* for every merk-land, under penalties.

The crown-charters of that period show efforts in the same direction: by charter under the great seal, 8th December 1509, King James IV. granted to John Grant of Freuchy the lands and castle of Urquhart on Loch Ness, taking him bound to build a tower with certain specified apartments—hall, chamber, kitchen, and so forth—"*cum pomeris cum necessariis arborum cepibus;*" and by a charter of the same date, to the son of the laird of Freuchy, of the lands of Glenmoriston, he was bound to build a hall, chamber, kitchen, "*et pomerium cum necessariis arborum cepibus;*" and so in many other charters of lands which had belonged to the crown.

Thus, alternately repressing depredations and encouraging attention to rural civilisation, the Scotch Parliament, during three centuries, recorded their good intentions and marked also the failure of their attempts to restore or produce a wooded character to Scot-

* Original Lease in Register House.

land. The last of such acts that may be quoted here is one passed immediately after the restoration of Charles II.* By it all former acts of repression or encouragement are re-enacted, with this addition—"that for ten years next ensuing, every heritor worth £1000 of yearly valued rent shall enclose four acres of land yearly at least, and plant the same about with trees of oak, elm, ash, plane, sauch, or other timber, at 3 yards distance;" and other proprietors in proportion.

Now was the time when Evelyn and the infant Royal Society of England were rousing the public attention to the neglected state of woods which had suffered much during the disturbances of the great Civil War. But there the soil and climate were both propitious, and, however neglected as ornament, wood had from the earliest time formed a leading object of the husbandry of England, both for timber and necessary fuel, before coal was extensively used. Even after the convulsions of civil war, and with only a partial acquaintance with his country, Evelyn finds more than a hundred seats, castles, halls, to be called famous for parks full of timber and woods, besides the then numerous Royal parks and the vast forests of Dean, New Forest, Windsor, Ashdown, Leonard, Sherwood, Epping, Purbec, Chute, and Woodstock.

Perhaps the example of England, which was really and thoroughly roused to the great national object of restoring its neglected woods, had as much effect on this side the border as our own acts of parliament. Certainly from that time planting became a fashion among us, though the efforts were limited at first by poverty, and extreme ignorance of how to set about procuring plants.

Even before that time, however, the efforts of the old sovereigns and the parliaments of Scotland for all those ages had not been altogether fruitless. Many old places bear marks of culture and planting that carry us back even to the fifteenth century, and in a few rare instances we have still wood-land which tells a tale of ancient creation—fine oaks, grown to maturity, and even past it, which the practised eye of the forester can tell to have grown from the "stools" of an earlier plantation, or even from the remains of the immemorial forest-land; such has been noticed at Darnaway, and, if we are not greatly mistaken, at Cadyow.

But all these, crowded round the mansion-house, and the houses of wadsetters and larger tenants, serve only to mark that the effort was confined to what we should now call ornamental or park planting, or what the old Scotch act of parliament described as "the gracious govemall of their lands by good policie." Nowhere in Scotland was there what we should call a planted wood during those ages, and, it may be said with confidence, not till the beginning of the eighteenth century.

The very earliest notice to be met with in written correspond-

* 1661, L. A., p. 235.

ence, of attention paid to planting in Scotland, is in a letter from James Lord Ogilvie to Sir David Lindsay of Edzell, of 1st March 1586.* It appears that both were planters, and (contrary to the belief expressed by Dr Walker and Loudoun)† they were not exclusively planters of exotic trees. The Lord Ogilvie, in the midst of more important subjects, writes thus: "To the right honourable, and his loving brother, the Laird of Edzeall"—"Whair ye desyr me to bestow sum few lynes on you, concerning my planting, &c. Trewly, albeit I be elder, I will give you place as maist skillful therein; your thowsand young birkis sall be richt welcom." And that is all. No doubt the thousand birks were the self-sown produce of the glen of Edzell—for nurseries as yet were not—but it seems to us a strange present to be so welcome to the lord of the glens of Cortachie and Airlie, where one would suppose the birch to be indigenous.

When our knowledge of the meagre planting of that age depends upon such fragments as the one just quoted, it is evident that the occurrence of such notices prove rather that the family papers have been preserved with more care, or that they have been more brought to light, than that such improvements were earlier practised there than elsewhere. Successive knights of the family of Glenurchy were great promoters of rural cultivation, and fortunately the papers of that family have not been scattered or destroyed, like so many of our Scotch archives. Sir Duncan Campbell, who held the barony from 1588 till 1631, was a great builder of castles and chapels, as well as of bridges and embankments against floods.

In the Baron Court books of Breadalbane of his time, there are regulations as early as 1621, against cutting brier or thorn *but in the waxing of the moon*—against cutting broom at any time of the year. There are ordinances requiring tenants and cotters to plant young trees within their kail-yards yearly—viz., "every holder of a merk-land, five; every cotter, three—either aik, asch, or plane—to be planted out, when ready to take up, in the most commodious places of their occupation. The lord's gardener to furnish the trees for two pennies the piece." And penalties are denounced against cutting or destroying such trees. These are, probably, fair enough specimens of the usual rural legislation of that time, following in the steps of the national legislature—and perhaps not with much more success—though there was no slackness of enforcing the punishment, especially the penalties. In the same year (1621), in a Baron Court at Finlarg, a more solemn tribunal than the common Justice of Peace Court of our day, an assize was set for the trial of numerous persons accused for cutting "aik, asch, birk, alrone, hassell, and sauch—for schuiting with hagbute at wyld foule, deir, and rae—for casting of peitis with torsheris."

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* Crawford Earldom, Claimants' case, p. 180, note k. † I. p. 88.

FIRST PERIOD.

If we were to divide our history of Scotch civilisation with reference to the creation of rural dwellings—and there might be worse *chaptering*—our first period within history, would be that of the stately feudal castle—Bothwell or Kildrummy—running parallel with the Edwardian castles of England, and coming to an end, through ruin or unfitness for the dwindled fortunes of the country, at the close of the cruel war of independence, in the fourteenth century.

Now, had those Norman castles any pleasure-grounds and woods? Gardens we know they had, terraces and parterres, and orchards of fruit-trees; and if we are allowed to reason from the taste shown in the site, the style, and the masonry, we shall not easily suppose the dwellers in such castles as Bothwell to have been blind to the beauty of the venerable oak and the graceful birch which grew on the river-bank adjoining, or so unenterprising as never to try to bring such neighbours nearer. But of systematic planting they have left no record or note, and it is not believed that the oldest of planted trees among us—the Finhaven chestnut or the Kippenross plane—can be placed with any probability so far back as that first era.

SECOND PERIOD.

After a long century of exhaustion and depression, the next start forward was under the policy introduced by James I. on his return from his English captivity, and pushed on, feebly and with many interruptions, by his successors. That was the era of the gaunt, *single*, grey tower, like Cawdor or Clackmannan, so many of which date from the middle of the fifteenth century.

It was a poor time—poor in money and taste; and at the beginning of that second era the castle-builder was content with strong masonry and those jealous walls with which they surrounded their gardens and "parks." But, after a century (A.D. 1500), the influence of the numerous acts of parliament, or some touch of feeling of natural beauty, reached even Scotland, and there is a change visible. In addition to the orchard, there is the "pleasaunce," with some "knots" and "alleys," of greater growth than the flower-beds of the parterre. Very generally, the style ran into the long straight avenue of double rows of ash and sycamore, and along with them often a few lines of such trees round the edges of the fields, with a small and timid intermixture of walnut and chestnut.

It was the century preceding the Reformation that we are now looking at. Some of our present great places were made then. A few men stand out clear in the history of that century, as men of taste and enterprise, bent on civilisation of all kinds, but markedly rural improvers. Such a one was William Lord Ruthven, first Earl of Gowrie. Godscroft, an eyewitness, tells us of his having built a gallery, and decorated it with pictures—it is supposed at Ruthven, and it would be interesting to ascertain if there be any remains of that old cultivation—and of his using quotations of

Virgil in conversation. It is not from the historian we learn one of the pleas for mercy which he had prepared to lay before his merciless judges. A scrap of paper, in his own hand, still preserved, which must have been penned in his dungeon, among legal and logical arguments in defence or mitigation, has one sigh for the dear old place,—"What pitie it war to tak me from my parks and policie!" He was executed for his share in the "Raid of Ruthven" in 1584. He planted a good deal in the manner of the ornamental planting described, and was fond of the chestnut and walnut.

Though we have not much written evidence of the fact, undoubtedly there were others of our nobility, immediately before the Reformation, and even during its stormy time, who showed good taste in embellishing their castles. The lords of Glenurchy of that period made Taymouth or Balloch—not the present structure, but one in the same situation. Seaton, Winton, Lethington, are all of that date. No doubt there must have been many tasteful and luxurious mansions of the churchmen. Strange to say, no one house of a church lord can be cited that at once, on the Reformation, changed into the mansion of a refined lay occupant who kept up its old embellishments.

One naturally asks, Are no planted trees living to witness that period of cultivation? Have we any growing trees, planted before the Reformation? That is, just now, three hundred years ago. Probably not. Of the oaks of Cadyow and Darnaway, mention has been made already, and there may be a few other vestiges of old forest-land, and exceptional cases of single oaks sent up generation after generation from the same root. But such cases do not meet the conditions of our question.

Then there is the sycamore of Kippenross, with its brass plate vouching a startling antiquity; and several at Newbattle, perhaps as old as it. But none of these are so old as to come within the period we are now considering.

Another tree of mythical antiquity has only of recent years disappeared—the venerable chestnut at Finhaven, which Dr Walker believed to be five hundred years old (in 1760), and to be the oldest planted tree in Scotland. His words are,—"It appears from its dimensions to have been planted about five hundred years ago." But that estimable naturalist seems to have visited the tree at different times, and his opinion of its age differed so much that we cannot rest upon his authority. Sir T. Lauder mentions a table at Carriston made out of its wood, with an engraved plate attesting its dimensions. The table has been removed, but the plate is preserved, and the laird of Finhaven has permitted a cut of it to accompany this paper. If it be thought by the skilful that this artless representation justifies Dr Walker's estimate of its great age, we must consider it the more interesting, as *this* tree was undoubtedly planted.

Another class of ancient trees deserves attention. In many

parts of England, and in some districts of Scotland, especially the West Highlands, there is a yew-tree found in every churchyard. The common reason assigned—the fitness of its wood for bows—is a silly one. The first onslaught of the warlike youth of the parish, desirous to arm themselves, must have put an end to the poor solitary yew. It is allowed to guess about the connection between the yew and the churchyard. It is certainly very old—perhaps older than our religion. In classical times the tree was held sacred to Pluto, and used in the sacrifices to the deities of the lower world. But, in truth, like the cypress, the dark solemn yew has always been considered symbolical of sorrow, and so appropriate to cemeteries. Might we conjecture that our early missionaries sometimes sought out the site of a pagan altar and the immemorial burial-place of the village, marked by that peculiar tree, to place there their little Christian church? However that may be, the churchyard and the yew-tree come together, and it can hardly be doubted that the yew so growing is a planted tree. In some instances, these churchyard yews are evidently of great antiquity; and Decandolle ventures to fix the Fortingall yew as early as the era of Christianity. Not presuming to question such an authority, and being altogether unable to test the method which the naturalist used for fixing the tree's age, it may be suggested, rather, that the yew, like the oak, and perhaps some other trees, has a faculty of reproducing itself indefinitely. Even when the main trunk is thoroughly dead and rotten, a new skin of bark sometimes comes up and shows considerable vitality, casing and enclosing the decayed body, and furnishing a wonderful growth of new branches and foliage. It is evident that here is the foundation of a new living tree, and, with favourable circumstances, there is no reason why the same process may not happen over and over, so that a yew may keep its place in the churchyard as long as heather covers our hills, or the cedars prefer Mount Lebanon.

But we have travelled beyond our purpose in these observations, and now gladly return to our chronological notices.

THIRD PERIOD.

When the storm of the Reformation had passed, and church property had found new owners, the increased wealth of our nobles soon showed itself in new and more costly dwellings. The old church cultivation improved the taste also; and now was the third era of rural architecture and embellishment, not so definitely marked in its commencement, but of which the culminating point is soon after the accession of James VI. to the English throne. It was then we had artists to design, and owners to appreciate, such dwellings as Crathes, Craigston, Craigievar, the Aberdeenshire castellated mansions, in short, Glammis and Castle Huntly, Pinkie and Fyvie, and a crowd of other edifices of that marked and peculiar architecture of which we are now so proud. That period of

fine taste ceases with the commencement of the troubles preceding the great Civil War.

There are thirty years of the seventeenth century marked by a cessation of progress in Scotland. Our scholars were driven abroad. The great Atlas of Scotland, *commanded* by James VI., and undertaken by Straloch at the entreaty of Charles I., was produced, mutilated and imperfect, in Holland. During the troubles of Charles I., and all the time of the Commonwealth, we were too busy about the "Covenant" and the "Service-Book," or too much held down by the iron hand of Cromwell, to indulge in Arcadian recreations. Yet, even in that disturbed and gloomy time, we have met, in a single charter-room, with evidence of some who found leisure to bestow upon planting, and that in the same direction—planting in the lowlands our native highland pine.

On 8th February 1637, the Earl of Lauderdale, father of the notorious duke, sent this letter to the knight of Glenurchy.

SIR,—I haife beine thir manie yeris verie desyrous to haive firr-tries to grow with me, and doe find by proofe that the soorest waye to make them prosper is to saw them in the seid; and hearing that you maye command greatt stoire therof, if I shall make bold to be your beggar, and heirby entreatt that you wald be pleased to send me sum good quantitie therof, that I maye caus my awin gardiners win itt, I houp you will not take itt in ill pairt, from your varie affectionatt cousin to serve yow. LAUDERDAILL.

HALIEROODHOUS, 8 of *Februar* 1637.

The request was granted, for the letter of thanks in return has been preserved.

There is another letter from a remarkable person, which gives us knowledge of several other planters among the Scotch nobility. It is from Anne Cunynghame, Marchioness of Hamilton, and written apparently after her husband's death, which took place in 1624, and very probably during her son's absence in the army of Gustavus Adolphus, 1630-32. Her "good-son," or son-in-law, the husband of her daughter, the Lady Margaret, was John Lord Lindsay of the Byres, created Earl of Lindsay in 1636, and styled Earl of Crawford after 1644.

From the Marchioness of Hamilton.

HONOURED COUSING,—I resavid your lettir and your feir-seid, and geiuis you heartily thankis for your cair in sending them to me. Believe me, I think moir of them nor ye can imagin, for I love them moir nor I dou al the frout-tris in the worild. I have alrady ane four or fayf houndir of my awin planting, that is pratti tries, and deid direckly weith them as ye set doune in your lettir. Bot my sonne louis them no les nor I dou, and hes wilit me to plant a greit manay meie, quhich meid me trobbil you for this yeir; and as ye have taken painis for me, I must requist you to gar prouayd soum of the seid for me.

Lord Linsay, my good-sonne, he is ane warie grit plantter of his eig as euir I kneue anay, and I am glaid to cherich him to it. He will send ane hors and man for ane leid of them within ten or tual dayis, and I must requist you to gar haue them rady. He hes taken in ane greit baunis for them. He can win the seid himselue, as he hes sein me dou, so ye wil only neid to send him the noutis. In quhat he can, I sal be bond to you ye sal

find him caynd. So, wiching you al happines, I rest your affectioned cousing to poure, ANNA CUNYNGHAME.

The Restoration brought a great change. Without participating in the frenzy of joy which marked the personal reception of Charles II. in England, we Scots were well pleased to be free of the great usurper, and of what we felt to be a foreign domination; and we looked forward with foolish confidence to the reign of a Stuart king over united kingdoms, which were to contend now only in the race of commerce and rural improvement. Our Scotch nobles were again familiar at court—not an improving scene for their morals, doubtless, but bringing them in contact with that remarkable development of tasteful luxury, mixed with scientific experiment on the newly-discovered laws of nature, which make the Restoration, with all its profligacy, still respected as the era of the foundation of the Royal Society. Oddly as it seems in our day, the two tastes went hand-in-hand—the love of scientific inquiry, with the passion for magnificence of living. This last showed itself very much in the embellishment of country seats. The virtuous and intelligent John Evelyn, the friend of Cowley, the comrade of Sir Robert Moray, the most active supporter of the infant Royal Society, was the chosen adviser of Sir Christopher Wren in his restoration of burned London, and of half the noblemen in England, engaged in restoring their family mansions ruined during the Civil War. Crowds of young men of quality, driven abroad during the Commonwealth, came home imbued with a taste for foreign art. From Evelyn's own account, the passion for magnificent dwellings, upon the model of those of Italy, was all but universal in England. He himself helped to direct it, so as to include planting and wood management, and it is much owing to that virtuous citizen—let us acknowledge also, in some degree to the native taste of the infatuated, graceless king—that that age of impudent profligacy was, more than any other, the period of rural, and especially of sylvan embellishment.

FOURTH PERIOD.

Scotland kept pace as much as her poverty allowed, in both kinds of progress. In natural science, we had Sir Robert Sibbald, a man of mighty schemes and some performance. Sir Andrew Balfour is said to have introduced dissection of the human subject in the study of anatomy, and he certainly founded the botanical garden of Edinburgh (c. 1680).

Country seats were built, or restored, and decorated; and planting, in the limited avenue and ornamental way, was carried on at many places where we can still find trees to be ascribed to that period—as at Taymouth, Hatton, Inverary, Drumlanrig, Hamilton, Hopetoun, Panmure, Kinross, Yester, Arniston, with a long *et cetera*.

The Revolution had, in some respects, the same effect which the Restoration had formerly produced. Scotsmen, whom the unhappy courses of the last Stuart had driven abroad, returned to their own

country with the taste and cultivation they had acquired on the Continent, and chiefly in Holland and Flanders, such as Baillie and Home of Marchmont, the Dalrymples, Lord Haddington, Dundas of Arniston, &c.

This race of rural improvers had not been long at work when a different kind of planting was introduced, which soon developed itself into the plantation of wood for shelter and profit, such as we now have. Dr Walker says, and perhaps justly, that Thomas, sixth Earl of Haddington, was the father of planting on a large scale, for profit, in Scotland.* One would be sorry to question Walker's testimony, or the evidence of that delightful little memoir which Lord Haddington published of his own planting. But even from it we can see that he had companions and rivals in the race, and among them let us not fail to honour the one to whom he attributes so large a share of the merit—his own wife, a daughter of the house of Hopetoun.

Lord Haddington, remarking that planting was little understood in Scotland till the beginning of last century (1700), adds—"I think it was the late Earl of Mar that first introduced the wilderness way of planting among us, and very much improved the taste of our gentlemen, who very soon followed his example." We are not aware that any plans of the Tyninghame wilderness, the origin of which is so pleasantly described by the Earl, have been preserved. It was no doubt in the fashion approved by Evelyn, and copied from Holland and France. One of those who followed the example of Alloa was the Earl of Mar's brother, the notorious James Erskine, Lord Grange, who (Dr Carlyle informs us) laid out at Preston a garden in the style of those times, full of close walks, and labyrinths, and wildernesses, which continued to be an object of curiosity down to 1740.†

Another contemporary and imitator of the Tyninghame fashion, or rather, the foreign fashion adopted there, was the first President Dundas of Arniston, whose woods still show traces of the labyrinth, a plan of which, made in 1726, is preserved at Arniston; and, by the kindness of Mr Dundas, a tracing of it is laid before the Society. There was a wilderness also at Blair. ‡

At the end of the seventeenth century, about the Revolution—since it is convenient to have a definite era—Andrew Heron was planting Bargally, in the Stewartry of Kirkcudbright, which Loudoun considered "the most interesting place in Scotland with respect to the introduction of foreign trees and shrubs."§ Dukes John and Archibald of Argyll followed, bringing their English experience and example to bear on Scotland. Lord Haddington made a rabbit-warren into that noble wood of Tyninghame. The Earl of Bute, Lord Loudoun, Lord Hyndford, were all planters in the most favourable situations of Scotland. The Earl of Panmure

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* Loudoun, i. p. 102. † Carlyle, p. 7. ‡ Walker's *Essays*, p. 54. § I. 95.

planted endless beech avenues at Panmure, which in modern memory were grand trees, and proved how the east coast may be made to produce the finest wood.

Old foresters said that Panmure and Yester were the two places where Beech was first planted largely. The taste spread rapidly. It was from Lord Tweeddale that the first President Dundas brought a present of thirty beech-plants, and one elm, in his portmanteau to Arniston, which are still standing in the south avenue in memory of the generous gift. They bear the marks of having been headed down, the forester of that age frequently beginning his treatment with beheading his victims.

Next came the taste for Larch, which we think must have been introduced in several places as soon as at Dunkeld,* though the story of the two flower-pot plants kept in the greenhouse by the Duke of Atholl may be true too. A few giant larches in the wilderness at Arniston must be as old, and one or two in the paradise by the river-side at Monymusk, are apparently coeval, as they are coequal, with the finest trees at Dunkeld.

In the north country, the Duchess of Gordon (the Mordaunt Duchess) was a great improver, having undertaken to teach her northern subjects the English hay-making and fallowing. She planted also, but to no great extent. Sir William Gordon of Invergordon "planted and drained considerable tracts of land." We learn the names of a few other improvers from the little anonymous treatise of 1729, quoted by Mr Chambers, and which is believed to have been written by Mackintosh of Borlum. He tells us of the improvements on the estate of Balnagowan, in Ross-shire; that Scott of Scotstarvet has made himself famous that way ("and" I am sure, he writes, "will grow rich"). He celebrates the praises of Master Hope of Rankeilor—that excellent young man, Mr Cathcart, eldest son to the honourable lord of that name, Sir Francis Kinloch, Sir John Dalrymple, Edmonstoun, Sir James Dick of Presontfield, Merchiston, Inverleith, Sir James Stuart of Goodtrees,† the Duchess of Buccleuch, My Lord Grange, Sir James Cuninghame, and Lord Livingston.

Now began the time of real business-like planting, which has gone on with increasing zeal and immense profit to the planter ever since, we may say now for a century and a half. And here, just at the right time, the subject has been taken up by Mr Robert Chambers in his *Domestic Annals of Scotland*,‡ to whose guidance the reader is willingly left.

It is proposed in the next number, and before giving the details ascertained by the returns of the Queries issued by the Society, to collect the more interesting of the accounts of planting given by our early planters themselves.

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* Walker says 1727 at Dunkeld. † Now Moredun. ‡ Vol. iii. 417.

RETURNS OF SEED COMPETITIONS held at Edinburgh on the 26th of February 1861.

Districts.	Seed exhibited in Competition by Growers to whom Medals were awarded.		Number of Competitors.	Award.	Competitors to whom Medals were adjudged.		Produce per Imperial Acre.	Weight per Bushel.	Date of Sowing.	Date of Reaping.	Ground on which the Prize Seed was Grown.		
	Names of Species and Varieties.	Quantity.			Christian Name and Surname.	Estate or Farm, and Post-Town.					Altitude.	Exposure.	Nature of Soil.
		qrs.					qrs.	lb.	1860.	1860.	Feet.		
Edinburgh, 26th February 1861.	Talavera Wheat, . .	5	2	Silver Medal,	Peter Inglis, . . .	East Pilton, Edinburgh, .	6	63¾	Mar. 1,	Sept. 18,	200	South.	Deep stiff black land.
	Talavera Wheat, . .	5	2	Bronze Medal,	John Curror, . .	Colinton Mains, Slateford,	5½	61	Mar. 22,	Sept. 24,	300	South.	Good dry soil.
	April Wheat (Red), .	5	1	Silver Medal,	John Gibson, . .	Woolmet, Dalkeith, . .	4	64	Mar. 23,	Aug. 25,	45	South.	Sandy, grown at Newhailes.
	Oxford Prize Wheat,	5	4	Silver Medal,	William Christie, .	Markle, Prestonkirk, . .	5½	64	Mar. 1,	Sept. 20-21	95	South.	Loam, on whin rock.
	Potato Oats, . . .	5	12	Silver Medal,	James Wilson, . .	Sheriffside, Gifford, . .	6	44	Last week of March	2d week of Sept.	600	South.	Irregular, principally red clay loam.
	Potato Oats, ...	5	12	Bronze Medal.	Jas. Wm. Hunter,	Thurston Mains, Dunbar,	4⅞	45½	Mar. 19,	Sept. 15,	500	N.W.	Clay, mixed with gravel.
	Hopetoun Oats, . .	5	6	Silver Medal,	James Stenhouse, .	Myles, Tranent, ...	7	44	Mar. 16,	Sept. 4,	360	South.	Sandy clay.
	Hopetoun Oats, . .	5	6	Bronze Medal,	Robert Cross, . .	Hilltown Liberton, . . .	7¼	42¾	Mar. 22,	Aug. 29,	200	North.	Light and variable.
	Early Angus Oats, .	5	3	Silver Medal,	John Gibson, . .	Woolmet, Dalkeith, . .	8	44	Mar. 19,	Sept. 11,	200	South.	Black loam.
	Early Angus Oats, .	5	3	Bronze Medal,	James Stenhouse, .	Southfield, Corstorphine,	9	43¼	Mar. 28,	Sept. 14,	90	South.	Black Loam.
	Sandy Oats, ...	5	6	Silver Medal,	Robert Nisbet, . .	Of Lambden, Greenlaw, Berwickshire, . .	6¾	..	Mar. 22,	Sept. 5,	314	South.	A foot of heavy black earth above strong red clay.
	Sandy Oats, ...	5	6	Bronze Medal,	Arthur Jas. Balfour,	Of Whittingham, Prestonkirk, ...	6	43	Mar. 21,	Sept. 11,	350	North.	Sharp soil, on red sandstone.
	Berley Oats, . . .	5	7	Silver Medal,	James Steedman, .	Swanston, ...	9	45	April 3,	Sept. 12,	600	South.	Light red rotten rock.
	Berley Oats, . . .	5	7	Bronze Medal,	Adam Stodart, . .	Damhead, Loanhead, . .	6	43	Mar. 29,	Sept. 11,	500	N.E.	Sharp soil.
	Black Tartar Oats, .	5	4	Silver Medal,	Adam Curror, . .	Myreside, Edinburgh, .	10	43	Mid. of Mar.	Sept. 1,	400	North.	Free loam.
	Black Tartar Oats, .	5	4	Bronze Medal,	Robert Hutchison,	Fosterton, Kirkcaldy, .	8	41½	Mar. 28,	3d week of Sept.	250	Level.	Sandy loam.
	Providence Oats, . .	5	7	Silver Medal,	James Steedman, .	Boghall, Roslin, ...	8½	44½	April 11,	Sept. 5,	700	South.	Light soft dry soil.
	Providence Oats, . .	5	7	Bronze Medal,	Thomas Brown, .	Pentland Mains, Loanhead,	7⅛	43¾	Mar. 26,	..	..	S. W.	Sandy clay.
	Canadian Oats, . . .	5	7	Bronze Medal,	John Gibson, . .	Woolmet, Dalkeith, . .	8½	48	Mar. 27,	Sept. 1,	200	South.	Black loam.
	Common Barley, . .	5	1	Silver Medal,	James Steedman, .	Swanston, ...	8½	57	April 10,	Sept. 10,	600	South.	Light red rotten rock.
	Chevalier Barley, . .	5	17	Silver Medal,	Sir Thos. B. Hepburn, Bart., .	Of Smeaton, Prestonkirk,	7	60	Mar. 10,	Aug. 19,	30	South.	Gravelly loam.
	Chevalier Barley, . .	5	17	Bronze Medal,	David Broadwood, .	Crowhill, Innerwick, Dunbar, ...	8¾	57½	Mar. 17,	Aug. 17,	10	S. & N.	Light and gravelly soil.
	Early Field Beans, .	5	4	Silver Medal,	Robert Cross, . .	Hilltown, Liberton, . .	7¼	66¼	Mar. 16,	Sept. 17,	220	South.	Loamy.
	Early Field Beans, .	5	4	Bronze Medal,	George Stenhouse,	West Pilton, Cramond, .	6	66½	Mar. 4-8,	Sept. 19,	..	South.	Clay.
	Late Field Beans, . .	5	2	Silver Medal,	Arthur Jas. Balfour,	Of Whittingham, Prestonkirk, ...	4	65½	Mar. 28,	Oct. 1,	300	North.	Loam on clay.
	Late Field Beans, . .	5	2	Bronze Medal,	James L. Millar, .	Waulkmill, Dunfermline,	..	66	Mar. 6,	Sept. 25,	50	South.	Heavy clay loam.
	Scotch Tares, . . .	3	2	Silver Medal,	John H. Hope, . .	So. Elphinstone, Tranent,	Mixed Crop of Beans and Tares.		Mar. 13,	Oct. 4,	370	South.	Gravelly loam.
	Scotch Tares, . . .	3	2	Bronze Medal,	James Christie, . .	Hailes, Prestonkirk, . .	2 Tares & 3 Beans.	66	Feb. 28,	Sept. 24,	120	South.	Muirish.

RETURNS OF DISTRICT SEED COMPETITIONS held in 1860 and 1861.

Districts.	Seed exhibited in Competition by Growers to whom Silver Medals were awarded: Name of Species and Varieties.	Quantity.	Number of Competitors.	Competitors to whom Silver Medals were adjudged: Christian Name and Surname.	Estate or Farm, and Post-Town.	Produce per Imperial Acre.	Weight per Bushel.		Date of Sowing.	Date of Reaping.	Ground on which the Prize Seed was Grown: Altitude	Exposure.	Nature of Soil.
		qrs.				qrs.	lb.	oz.			Feet.		
Ayrshire, Oct. 25, 1860	Chevalier Barley, . .	3	2	Robt. Montgomery,	Cockhill, Dundonald, Fairlie Estate,	7	55	0	April 1860	Sept. 1860	50	S.W.	Loam.
	Long Oats — "Tom Findlay," . . .	3	3	Robt. Montgomery,	Cockhill, Dundonald, Fairlie Estate.	9	41	0	April 1860	Sept. 1860	50	S.W.	Loam.
	Wheat — Long Essex,	3	3	James Wright, . .	Kilnford, Dundonald, . .	5	65	0	Nov. 16, 1859	Sept. 10, 1860	80	S.W.	Light gravelly soil.
Fifeshire. Oct. 30, 1860.	Wheat—"Jackson's Nonsuch," . . .	3	5	A. W. Russell, . .	Parkhill, Newburgh, . .	..	63	15	Oct. 22, 1859	Aug. 31,	18	West.	Alluvial.
Inverness, Oct. 30, 1860, and Mar. 1, 1861.	White Wheat, . . .	3	4	Evan Logan, . . .	Stoneyfield, Inverness, .	4½	63	1	Last week of Nov. 1859	Last week of Sept. 1860	100	South.	Sandy black loam.
Inverness, Oct. 30, 1860, and Mar. 1, 1861.	Chevalier Barley, . .	3	5	Hugh A. Gair, . .	Hilton, Inverness, . . .	4	55	4	April 13,	Middle of Sept.	100	South.	Light gravelly loam.
	Sandy Oats, . . .	3	3	James Stewart, . .	Balmacaan, Drumnadrochit,	5	44	0	April 4,	About Sept. 25.	150	South.	Gravelly dark loam.
	Perennial Ryegrass, .	2	2	Donald Paterson, .	Balrobert, Inverness, . .	2	25	9	Ap. 17, 1858 seed of 2d year's grass	Aug. 25, 1860	400	S.W.	Brown stoney loam, resting on mountain clay.
Glen Urquhart, Feb. 26, 1861.	Sandy Oats, ...	18	6	The Earl of Seafield,	Balmacaan, ...	6	43	0	Mar. 22,	Sept. 19,	250	South.	Loamy.
	Chevalier Barley, . .	6	2	John Sinclair, . .	Borlum, ...	5	55	8	April 14,	Sept. 10,	200	North.	Loamy.
Black Isle Society, Mar. 7, 1861.	Chevalier Barley, . .	3	6	Donald M'Kay,	Farm of Kersoch, Estate of Red Castle, Kepoch, by Inverness,	5	57	8	April 20, 1860	Aug. 20, 1860	20	S.W.	Gravelly.
	Potato Oats, . . .	3	2	Alex. Thomson, .	Tarradale, by Beauly,	5½	45	12	Mar. 29, 1860	Sept. 10, 1860	100	South.	Black loam.
Stirling, Oct. 12, 1860.	Wheat—"M'Ewen's Prizetaker," . .	3	6	Thomas Murdoch,	Westwood of Blair-drummond, by Stirling, ...	6	63	8	End of Oct. 1859	Middle of Sept.	30	South.	Loamy clay.

LIST OF PLOUGHING COMPETITIONS *reported to the Society in* 1860-1861.

District.	Date.	No. of Ploughs.	Extent.	Time.	Amount of Premium.	First Premium and Society's Medal Awarded to
ABERDEENSHIRE—						
Banchory House Home Farm..	1 Dec. 1860	20	¼ acre	2½ hours	£4 1 0	Robert Ross, Banchory Hillock.
Bridgend	31 Jan. 1861	33	⅕ acre	5 hours	6 16 6	James M'Pherson, farm-servant, Bridgend.
Newhills	17 Dec. 1860	27	Rate of 1 acre	10 hours	4 0 0	Jos. Balnaves, farm-servant, Meikle Clinterty.
Redbog	24 Jan. 1861	31	¼ acre	3 hours	3 1 6	Wm. Archibald, farm-servant, Strichen House.
Tulanamoult	24 Jan. 1861	29	⅓ acre	4½ hours	3 0 0	William M'Ritchie, Glaslaw.
ARGYLLSHIRE—						
Craig Farm	15 Mar. 1861	16	½ acre	5 hours	3 5 0	Peter Crerar, Brackley.
Dalrioch	29 Jan. 1861	40	1 rood 13 poles	3 hrs. 50 m.	4 2 6	Donald Paterson, farm-servant, Moy.
Gorton	9 Mar. 1861	16	½ acre	5 hours	3 10 0	Hugh Lyon, Gorton.
Inverary	1 Mar. 1861	16	½ acre	6 hours	3 0 0	Malcolm Dunn, farm-servant, Inverary.
Killocran	20 Feb. 1861	21	1 rood 30 poles	5¼ hours	3 2 6	James Mitchell, Largiemore.
Ledag Benderlock	15 Mar. 1861	17	1 rood 20 poles	6 hours	3 1 6	Hugh Campbell, Ferlochan.
Poltalloch Society	1 Feb. 1861	18	½ acre	5 hours	3 16 0	Donald M'Nair, farm-servant, Upper Largie.
AYRSHIRE—						
Balloch Hillie	23 Feb. 1861	39	2 roods 4 poles	5¼ hours	3 7 6	Alexander M'Donald, Drumbeg.
Bridgend	31 Jan. 1861	30	¼ acre	4 hours	4 12 0	John Torbit, farm-servant, Pennyfadzeoch.
Craigneil	6 Mar. 1861	33	Rate of 1 acre	10 hours	4 9 0	John M'Gill, farm-servant, Enoch, Girvan.
Friarland	2 Feb. 1861	23	1 rood 11 poles	5 hrs. 6 m.	3 19 0	Hugh Wallace, Crofthead.
Fenwick Society, Gardrum ...	20 Feb. 1860	29	1 rood 6 poles	16 h. p. S. ac.	5 10 0	William Watt, Gainleitch.
Mauchline Mains	29 Jan. 1861	26	½ acre	7 hours	5 0 0	Alex. Mills, farm-servant, Mauchline Mains.
Oldmill...	6 Feb. 1861	29	¼ acre	4 hours	4 6 6	David Smith, farm-servant, Bank.
Overton	2 Feb. 1861	30	Rate of 1 acre	14 hours	4 5 0	David Duncan, farm-servant, Townhead.
St Quivox Society, Kirklandholm...	30 Jan. 1861	21	1 rood 20 poles	6 hours	4 0 0	James Anderson, junior, Kirkhill.
BANFFSHIRE—						
Broom	20 Feb. 1861	39	½ acre	5 hours	6 3 0	John Anderson, farm-servant, Kindroght.
BERWICKSHIRE—						
Blackburn	14 Dec. 1860	26	¾ acre	7½ hours	4 8 0	William Sligh, farm-servant, Cove.
Crumstane	12 Dec. 1860	17	2 roods 20 poles	8 hours	6 12 6	John Cockburn, Chapel.
Eccles Association, Loanknow	13 Dec. 1860	23	¾ acre	7 hours	5 0 0	John Wilson, Wormerlaw.
Fogo Ploughing Club, Fogo East-end Farm ...	17 Dec. 1860	24	2 roods 20 poles	6 hours	4 4 6	James Blackie, Fogorig.

LIST OF PLOUGHING COMPETITIONS (*continued*).

District.	Date.	No. of Ploughs.	Extent.	Time.	Amount of Premium.	First Premium and Society's Medal Awarded to
BERWICKSHIRE (*continued*)—						
Greenknowe	26 Feb. 1861	30	$\frac{3}{4}$ acre	$7\frac{1}{2}$ hours	£6 12 6	Ebenezer Hutton, Greenknowe.
Lammermuir Club, Bothwell...	11 Feb. 1861	...	Rate of 1 acre	10 hours	3 0 0	Archibald Paterson, Middle Monynut.
Lauder Barns	26 Jan. 1861	41	$\frac{1}{2}$ acre	5 hours	4 10 0	David Darling, farm-servant, Craigend.
Milnegraden	27 Jan. 1861	18	$\frac{3}{4}$ acre	7 hours	5 10 0	William Alexander, Coldstream Mains.
Thornydyke Mains	28 Jan. 1861	27	$\frac{3}{4}$ acre	$7\frac{1}{2}$ hours	4 5 0	A. Galbraith, farm-servant, Thornydyke Mains.
BUTE—						
Arran Society, Torrylin ...	27 Feb. 1861	30	1 rood 5 poles	3 hrs. 36 m.	4 0 0	Neil Ferguson, farm-servant, Arran.
Bute Society, East Rachraggan	19 Feb. 1861	50	$\frac{1}{4}$ acre	4 hours	7 11 6	Robert Stewart, Upper Ardroscadale.
CAITHNESS-SHIRE—						
Caithness Society, Stirkoke ...	6 Feb. 1861	38	$\frac{1}{2}$ acre	5 hours	3 15 0	John Phimister, Hempriggs.
Dunbeath	27 Feb. 1861	27	$\frac{1}{2}$ acre	5 hours	4 17 6	Alexander Bremner, farm-servant, Clyth Mains.
Scrabster	20 Feb. 1861	57	$\frac{1}{2}$ acre	5 hours	3 15 0	James Geddes, Castlehill.
DUMBARTONSHIRE—						
Cardross Society, Mildovan ...	1 Feb. 1861	24	Rate of 1 acre	16 hours	10 0 0	William Traquair, Cairniedrouth.
Gavel	5 Feb. 1861	21	$\frac{1}{2}$ acre	6 hours	4 14 6	James Forsyth, farm-servant, Ward Park.
Kilmaronock and Bonhill Society, Lochend ...	29 Jan. 1861	23	Rate of 1 acre Sc.	18 hours	5 8 6	John Buchanan, farm-servant, Strathleven.
DUMFRIESSHIRE—						
Glencartholm	5 Mar. 1861	19	$\frac{1}{2}$ acre	5 hours	5 17 0	James Marshall, farm-servant, Glencartholm.
Penpont—	1 Feb. 1861	19	$\frac{1}{2}$ acre	5 hours	4 4 0	Mitchell M'Donald, farm-servant, Arkland.
Tower	23 Feb. 1861	24	$\frac{1}{2}$ acre	6 hours	3 8 6	John Robertson, farm-servant, Tower.
Waterfoot	8 Feb. 1861	28	$\frac{1}{2}$ acre	5 hours	8 15 0	George Farish, Branteth.
EDINBURGHSHIRE—						
Borthwick Mains	25 Jan. 1861	30	Rate of 1 acre	10 hours	4 9 0	Adam Hare, farm-servant, Fushie Bridge.
Campend	8 Feb. 1861	22	$\frac{1}{2}$ acre	7 hours	3 11 6	William Hunter, farm-servant, Woolmet.
Dalhousie	26 Jan. 1861	27	$\frac{3}{4}$ acre	$7\frac{1}{2}$ hours	3 16 0	George Rutherford, Lingerwood.
Hatton Mains	7 Feb. 1861	47	$\frac{1}{2}$ acre Scotch	$7\frac{1}{2}$ hours	6 5 0	Alexander Russell, Dales.
Mauldslie	18 Feb. 1861	28	$\frac{1}{2}$ acre	$5\frac{1}{2}$ hours	3 11 6	William Cowan, farm-servant, Arniston.
Parduvine	26 Feb. 1861	34	$\frac{1}{2}$ acre	6 hours	5 8 6	Thomas Brown, Rosewell Mains.
Shothead	28 Jan. 1861	33	$\frac{1}{2}$ acre Scotch	$7\frac{1}{2}$ hours	7 2 0	John Laing, Cocklaw.

LIST OF PLOUGHING COMPETITIONS (*continued*).

District.	Date.	No. of Ploughs.	Extent.	Time.	Amount of Premium.	First Premium and Society's Medal Awarded to
ELGINSHIRE—						
Strathspey Society, Auchterblair	22 Feb. 1861	16	½ acre	3½ hours	£3 1 6	James Blair, Gartine.
FIFESHIRE—						
Abernethy Association ...	9 Feb. 1861	20	½ acre	5 hours	3 3 0	Alexander Ness, Balgonie.
Bankhead, Dunnikeer... ...	30 Jan. 1861	40	½ acre Scotch	6 hours	4 16 0	John Young, farm-servant, Dothan.
Blair	24 Jan. 1861	31	½ acre	5 hours	3 7 6	Alexander Graham, farm-servant, Thornton.
Crossgates Society, Cuttlehill	14 Dec. 1860	36	½ acre	5 hours	3 15 6	Andrew Collier, Muirton.
Falside, Kingsbarns	8 Feb. 1861	22	½ acre	5 hours	4 0 0	John Brown, Carngour.
Wester Cash, Strathmiglo ...	30 Jan. 1861	25	½ acre Scotch	5 hours	3 0 6	David M'Queen, Wellfield.
FORFARSHIRE—						
Kinnettles	13 Dec. 1860	56	½ acre	5 hours	7 9 0	William Wyllie, Newton of Fothringham.
Newton of Boysack	25 Jan. 1861	39	½ acre Scotch	5 hours	5 15 0	James Souter, Bankfoot.
HADDINGTONSHIRE—						
Coalstoun	9 Feb. 1861	51	½ acre Scotch	6 hours	5 5 0	Adam Turnbull, farm-servant, Bolton.
Hedderwick Hill	7 Feb. 1861	28	¾ acre		4 10 0	Peter Goodall, Wester Broomhouse.
INVERNESS-SHIRE—						
Antfield, Dores	27 Feb. 1861	26	½ acre	5 hours	5 15 0	Donald Brodie, farm-servant, Dell of Inches.
Banchor	28 Feb. 1861	19	½ acre	5 hours	3 5 0	John Stewart, Bialid.
Dell, Strathnairn	13 Mar. 1861	23	½ acre	5 hours	7 12 6	Alexander Macandrew, Faillie.
Mains of Erchless	23 Feb. 1861	49	½ acre	5 hours	3 0 0	William Macdonald, Moniack.
Moniack	15 Feb. 1861	34	½ acre	5 hours	5 0 0	Donald Gordon, Teachmuck.
KINCARDINESHIRE—						
Arbeadie, Banchory	30 Jan. 1861	38	½ acre	4¾ hours	4 1 6	Alexander M'Hardy, Pittencairy.
Cairnrobin	22 Jan. 1861	32	½ acre	5 hours	7 4 0	David Coutts, farm-servant, Mains of Findon.
Durris	12 Dec. 1860	39	Rate of 1 acre	10 hours	5 18 6	George M'Hardy, South Barns.
Elsick Association, Burnside...	29 Jan. 1861	20	Rate of ½ acre	5½ hours	6 8 0	George Burnet, farm-servant, Burnside.
Fettercairn Club, Balbegno ...	15 Dec. 1860	73	⅓ acre	4 hours	5 0 0	Alexander Milne, farm-servant, Thainston.
Hatton	12 Dec. 1860	40	½ acre	5 hours	3 5 6	David Sim, farm-servant, Thornton.
Mains of Fordoun	12 Dec. 1860	58	½ acre	5 hours	4 4 0	James Balfour, Westertown of Mondynes.
Nether Auquhollie, Fetteresso	23 Jan. 1861	23	Rate of 1 acre	10 hours	5 13 6	John Caird, Newbigging.
Netherley	23 Feb. 1861	20	⅓ acre	3½ hours	4 15 6	Alexander Duncan, Rinchal.
Pitdrichie	29 Jan. 1861	38	1 rood 24 poles	4 hours	3 15 0	George Mearns, Mondynes.

LIST OF PLOUGHING COMPETITIONS (*continued*).

District.	Date.	No. of Ploughs.	Extent.	Time.	Amount of Premium.	First Premium and Society's Medal Awarded to
KINROSS-SHIRE—						
Fordel	21 Feb. 1861	27	½ acre	5 hours	£3 2 0	Alexander Elder, Birneyhill.
Kinross...	30 Jan. 1861	34	½ acre	5 hours	3 0 0	Robert Galloway, farm-servant, Burleigh.
KIRKCUDBRIGHT—						
Glebe of Balmaclellan ...	19 Feb. 1861	32	1 rood	3¼ hours	4 12 0	Js. Crockett, farm-servant, Balmaclellan Manse.
Maryfield	1 Feb. 1861	20	½ acre	5 hours	5 4 0	James Nichol, Overton of Ingleston.
LANARKSHIRE—						
Fouldsidnes, Cambusnethan ...	25 Jan. 1861	24	1 rood 25 falls	9 hours	7 5 0	William Allan, Merrytown.
Glenboig, New Monkland ...	29 Jan. 1861	27	1 rood 25 poles	5 hrs. 25 m.	7 7 6	William Mitchell, North Medrox.
Greenhill, Wiston	5 Feb. 1861	20	½ acre	5 hours	4 7 6	William Muir, junior, Hardington Mains.
Harperfield	20 Feb. 1861	19	½ acre	6½ hours	7 12 6	Thomas Scouler, Hillhouse.
Lumloch	29 Jan. 1861	29	Rate of 1 acre	13½ hours	9 2 6	William M'Kean, Lumloch.
Newhouse Mill, East Kilbride	29 Jan. 1861	26	½ acre	5 hours	8 13 0	John Legget, Birniehill.
Old Monkland, &c. So., Bogside	8 Feb. 1861	36	Rate of 1 acre	14 hours	8 13 0	Alexander Gilchrist, Park.
Pyetknow, Culter	27 Feb. 1861	15	½ acre Scotch	7½ hours	4 14 0	James Pairman, Wolf Clyde.
Rushan	21 Feb. 1861	16	1 rood 16 poles	5½ hours	3 5 0	William Cameron, Dykescroft.
LINLITHGOWSHIRE—						
Inveravon	2 Feb. 1861	72	Rate of 1 acre	9 hours	3 0 0	Alexander Lamb, farm-servant, Langton.
W. Lothian Soc., Niddry Mains	19 Feb. 1861	40	½ acre	7½ hours	3 17 6	Alexander Kerr, farm-servant, Grange.
Whitburn	29 Jan. 1861	26	½ acre Scotch	8 hours	3 0 0	John Cameron, Blackburn Hall.
ORKNEY—						
Boardhouse, Birsay	1 Feb. 1861	22	½ acre	5 hrs. 52 m.	3 4 0	Alexander Ironside, Vetquoy.
Strathore	31 Jan. 1861	19	½ acre	5 hours	3 18 0	Malcolm Heddle, Balfour Mains.
PEEBLESSHIRE—						
Ballansidge, Manor	8 Feb. 1861	15	¾ acre	7 hours	3 12 0	John Suttie, farm-servant, Haswellsykes.
Chapelhill, Peebles	25 Jan. 1861	21	1 acre	10 hours	4 12 0	John Fraser, farm-servant, Kidstone.
PERTHSHIRE—						
Acharn, Kenmore	8 Mar. 1861	28	1 rood 22 poles	12 hours	4 0 0	John M'Diarmid, Duallin.
Blairdrummond Soc., Arneive	28 Feb. 1861	25	Rate of 1 acre	12½ hours	4 11 0	Andrew Ferguson, farm-servant, Westwood.
Cablea, Strathbran	20 Mar. 1861	22	½ acre	7 hours	3 0 0	John Robertson, Trochery.
Cairnies, The	25 Feb. 1861	20	2 roods 7 poles	6 hours	4 11 0	John Hunter, farm-servant, Glen Tulchan.
Drummond Park, Logiealmond	29 Mar. 1861	28	2 roods 5 poles	5 hours	3 5 0	John Christie, Dalcrue.
Dun-Alastair	2 Nov. 1860	32	1 rood 13½ poles	7 hours	7 0 0	Donald M'Donald, Druimchastle.
Dunblane Club, Stonekirk ...	19 Feb. 1861	27	½ acre	6½ hours	10 0 0	Robert Hill, farm-servant, Glassingall.

LIST OF PLOUGHING COMPETITIONS (*continued*).

District.	Date.	No. of Ploughs.	Extent.	Time.	Amount of Premium.	First Premium and Society's Medal Awarded to
PERTHSHIRE (*continued*)						
Dupplin Home Farm	6 Feb. 1861	42	¾ acre	7½ hours	£3 3 0	John Graham, farm-servant, Nether Cairnie.
Easter Coul, Auchterarder ...	21 Feb. 1861	18	1 rood 36 poles	4 hrs. 47 m.	3 1 0	John Mailer, Gend.
Gourdie	5 Dec. 1860	35.	½ acre Scotch	6 hours	4 13 0	Thomas Keir, farm-servant.
Lix, Killin	22 Mar. 1861	20	1 rood 33 poles	12 hours	4 0 0	John Macfarlane, Daldravaig.
Logie and Leecropt So., Steeds	7 Feb. 1861	23	Rate of 1 acre Sc.	14 to 16 hrs.	4 10 6	Charles M'Donald, Knockhill.
Mains of Gramtully	16 Mar. 1861	26	½ acre	6½ hours	3 3 0	Robert Macfarlane, farm-servant, Skeltown.
Methven Society, Kinnonpark	6 Mar. 1861	31	2 roods 20 poles	5½ hours	3 6 6	George Graham, farm-servant, Cultmalundie.
Middlefrew	18 Feb. 1861	25	1 rood 1 fall	4 hours	3 7 6	William Johnman, Middlefrew.
Monzievaird and Strowan Society, Laggan ...	22 Feb. 1861	21	½ acre	6½ hours	4 1 0	Robert Lauder, Monzievaird.
Trinafour, Blair Athole ...	15 Mar. 1861	15	½ acre	5 hours	3 13 6	Thomas Mackenzie, Kindrochit.
Windyedge, St Martins ...	7 Feb. 1861	25	½ acre	6 hours	4 0 0	Charles Imrie, Bogs, Melginch.
RENFREWSHIRE—						
Flender, Mearns	19 Feb. 1861	14	Rate of 1 acre Sc.	19 hours	3 2 0	Alexander Fleming, Newford.
Polnoon, Eaglesham	21 Feb. 1861	17	Rate of 1 acre Sc.	17 hours	4 18 0	James Steven, Polnoon.
ROSS-SHIRE—						
Calrossie	29 Jan. 1861	56	½ acre	5 hours	4 5 0	David Fraser, Locheye.
Mains of Cromarty	22 Feb. 1861	39	½ acre	5 hours	7 5 0	Thomas Simpson, farm-servant, Newton.
Torgorum	7 Feb. 1861	47	½ acre	4 hours	3 0 0	Simon Fraser, Tomich.
SELKIRKSHIRE—						
Selkirk Club, Greenhead ...	23 Jan. 1861	19	½ acre	5½ hours	4 15 0	Andrew Moffat, farm-servant, Castleside.
STIRLINGSHIRE—						
Arnprior	31 Jan. 1861	28	½ acre Scotch	6 hours	3 17 6	Walter M'Gibbon, farm-servant, Mirkend.
Bannockburn Assoc., Braehead	30 Jan. 1861	19	½ acre	5 hrs. 20 m.	5 15 0	Alexander Donaldson, Woodcockfauld.
Bonnyside	18 Feb. 1861	37	½ acre Scotch	7 hours	5 0 0	Hugh Dick, farm-servant, Greenrigg.
Castle of Rednock	21 Feb. 1861	19	Rate of 1 acre Sc.	15 hours	3 17 6	Robert Sorley, farm-servant, Cassafair.
SUTHERLANDSHIRE—						
Dunrobin	8 Feb. 1861	38	1 rood 34 poles	5 hours	5 1 0	Daniel Grant, farm-servant, Crakaig.
WIGTOWNSHIRE—						
Mains of Park	9 Feb. 1861	56	½ acre	5½ hours	6 2 6	John Devine, farm-servant, Drumflower.
Monreith	30 Jan. 1861	80	Rate of 1 acre Sc.	12 hours	9 7 6	Alex. M'Gowan, farm-servant, Port William.
Two Mark	19 Jan. 1861	33	½ acre Scotch	5½ hours	5 12 6	Joseph Hamilton, farm-servant, Dumbreddon.
Whitehills	22 Jan. 1861	34	½ acre	4½ hours	7 16 6	James Parker, farm-servant, Baldoon.

PROCEEDINGS IN THE LABORATORY.

By Professor Anderson, M.D., Chemist to the Society.

ON THE USE OF ANNATTO FOR COLOURING CHEESE.

It is well known that annatto has long been extensively used for colouring cheese and butter, but more especially the former; and those interested in its manufacture have often urged upon the dairy farmer the objectionable nature of the practice, and the propriety of abandoning it. These representations, however, do not appear to have been productive of any improvement, for the custom is as prevalent as ever, the excuse offered for it being, that the purchasers prefer a high-coloured cheese, and that it has become a commercial necessity to pander to their prejudices. In Scotland, the practice is said to be extending, and the subject has recently been brought under my notice by Sir J. S. Menteth, Bart., to whom I am indebted for specimens of preparations of annatto used in some of the dairy districts.

Annatto is extracted from the seeds of a South American plant, the *Bixa orellana*, now chiefly cultivated in Cayenne. The seeds are enclosed in a pod, and surrounded by the colouring matter. To obtain the latter, the contents of the pods are removed, covered with water, and left for some weeks, or even months, until the whole becomes putrid. The mass is then pressed through sieves, and the residue allowed to ferment for a longer period, and again pressed, so as to remove any colour which may remain after the first operation. The colouring matter is then allowed to subside as thoroughly as possible, and the water being removed, the residue is boiled down in coppers until it acquires a proper consistence. It is then ready for the market; but when imported into this country it is often subjected to various processes, and sold as rerolled annatto. The object of this is to get it into a condition better fitted for sale; but these processes become an inlet to adulteration; and there are probably few articles of commerce which it is more difficult to obtain genuine. The substances most commonly employed to adulterate it are turmeric, starch, rye-flour, chalk, gypsum, &c.; and many instances have been observed in which they have been used to the extent of 40, 50, or even 60 per cent. These are harmless adulterations, and objectionable only in as far as they diminish the amount of colouring matter, and therefore render the annatto less valuable for its legitimate uses as a dye. But cases have occurred in which the quantity of these substances used has been so large as to reduce the colour to an extent likely to excite the suspicion of the purchasers; and then Venetian red, a substance made from gypsum and oxide of iron, red-lead, and it is said even vermilion, have been used for the purpose of imitating

the natural colour. Copper has also been occasionally found in it, but it can scarcely be called an adulteration, and has most probably found its way into the substance during its preparation for the market. The prevalence of adulteration may be judged of by the fact, that of thirty-four samples examined by Dr Hassall only two were genuine. The foreign matters were chiefly turmeric, flour, and chalk, but lead was found in five cases, and copper in four. Accum and Mitchell also state that they have frequently found lead in annatto, and sometimes even vermilion, which, as a mercurial preparation, is still more objectionable; and that cases of lead-poisoning, produced by cheese in which adulterated annatto had been used, have come under their notice.

The knowledge of these facts has probably led to the introduction of fluid extracts of annatto, which are now manufactured on a very considerable scale, and form a regular article of commerce in some of the dairy districts, where they are sold in stone bottles of different sizes, with regular printed labels, certificates, &c., and at prices ranging in general about 5s. or 6s. per quart. These extracts appear to be all made in a similar manner, by treating the annatto with a dilute solution of an alkali or alkaline carbonate, and the difference appears to consist mainly in the proportions. They are all in the form of dark blood-red fluids, soapy to the touch, and frothing when shaken. They are not generally clear, but contain a solid matter in suspension, which appears most abundant in those containing the smallest quantity of alkali. They have all a strongly ammoniacal and offensive putrid smell, resembling that of cow-dung. I have analysed several of these extracts.

Mitchell's liquid annatto is contained in stone bottles, sealed with the maker's coat of arms, to counterfeit which, according to a warning on the label, is felony, and its composition is—

Water,	86.33
Colouring matter,	9.52
Ash,	4.15
	100.00

The ash contains various alkaline salts, and its composition is more particularly given in the subjoined analysis, in which the results are calculated so as to show the composition of 1 lb. of the fluid :—

	Grains.
Water,	6043.1
Colouring matter,	666.4
Oxide of iron and alumina,	8.2
Chloride of sodium,	8.7
Sulphate of lime,	2.6
Sulphate of magnesia,	3.0
Sulphate of potash,	116.2
Carbonate of potash,	151.8
	7000.0

In this case, the quantity of actual annatto contained in the fluid is considerable, amounting to about one and a-half ounce to the pound; and the alkali, which in this case is potash, has been added very sparingly, and in no larger quantity than just suffices to convert the annatto into a soluble compound. In other cases this precaution has not been taken, and the alkali has been used in very large quantity. Two examples are given below:—

	Nichol's extract.	Titley's extract.
Water,	81.63	88.08
Colouring matter,	6.28	3.60
Ash,	12.09	8.32
	100.00	100.00

In the first of these samples the ash consists almost entirely of an alkaline carbonate, which, indeed, is so abundant that the extract itself effervesces violently on the addition of an acid; and as its quantity is nearly twice as great as the colouring matter, it is obvious that it has been used in great excess. The same observations apply to Titley's, with the addition that the annatto itself forms little more than 3½ per cent of the fluid; or a pound of the fluid contains less than ⅗ oz. of annatto, and about double that quantity of alkali. As the best annatto can be bought for about 2s. 6d. per lb., it follows that a pound of this extract can be made for about 2d., or a quart for 5d., so that the dairyman pays a very large price for the article he uses.

The addition of annatto to cheese is alleged, by those opposed to its use, to act injuriously in two ways. 1st, By affecting the health of the consumer; and, 2d, By diminishing the quantity of cheese produced from the milk.

As regards the first of these objections, it may be stated that genuine annatto is not a poison. It is entirely harmless, and as it is used in very small quantity, it is not likely to have any effect. But the case is very different when the annatto is adulterated with lead or other metallic compounds, which are themselves poisonous. No doubt the quantity of annatto used in cheese is such that, unless in the case of highly adulterated samples, the lead will be very minute, and not likely to affect the health. But it must be remembered that lead is what is called a cumulative poison—that is to say, the continued repetition of doses which are individually incapable of producing any effect, may, in the course of weeks or months, cause symptoms of poisoning to show themselves. Cases are actually on record in which poisoning has been produced by the presence of lead in cheese, and at least one in which that substance was traced back to the annatto. It is well known that lead is frequently found in cheese, but in very small quantity, and there can be little doubt that it is in most cases due to the use of adulterated annatto; and though, in the great majority of instances, the amount is so trifling that no bad effect is likely to follow, the bare possi-

bility of injurious symptoms being produced ought to put an end to its use. In the case of liquid annatto these effects are less likely to occur. The samples of which the analyses have already been given were quite free from lead; and it is probable that the makers of such articles will take care to supply themselves with genuine annatto, as it is only by doing so that they can secure a uniform product. Still, it is quite possible that adulterated annatto may pass into their hands, and be found in the fluid extracts.

The second objection to the use of annatto—namely, that it diminishes the quantity of cheese—is a point which can only be determined by actual experiments in the dairy; but, *a priori*, we should not expect any such effect to be produced. A vegetable colouring matter such as annatto cannot act in any way upon the milk, or interfere in the process of coagulation, especially when we take into account the very small quantity used. But it is otherwise with the liquid extracts containing alkalies or alkaline carbonates. It is well known that, in the manufacture of cheese, it is necessary that the state of acidity of the milk be closely attended to; and it may possibly happen that an extract of annatto containing a large quantity of alkali may so far derange the calculations of the cheese-maker as to diminish the quantity or injure the quality of the cheese produced. I say it may so act, because it is very far from being certain that any such effects will be produced, and it appears most probable that they will only be observed, if at all, when a change takes place from one material to another. It will, in general, be found that in all processes such as cheese-making—success in which is dependent on attention to minutiæ—the details are never altogether the same. Thus it will be found, for example, that in different dairies the milk is treated in different manners, and yet both succeed equally well, because experience has taught them to make proportionate modifications in other parts of the process; and we may fairly expect that the effects which might be produced by a highly alkaline extract of annatto may be counterbalanced by some modification in the manufacture.

The general conclusion to which all these considerations point is, that there is no distinct evidence to show that the use of annatto is injurious, provided it be genuine; but as adulterated samples of that dye are the rule, and genuine ones the exception, there can be but one opinion as to the advisability of its discontinuance. It is clear, however, that the consumers of cheese have this matter entirely in their own hands; for so long as the maker finds that a better price is given for a high-coloured cheese, just so long will he continue to give it the requisite tint by artificial processes. Universal experience has shown that, whenever the public choose to rely on any particular character as a standard by which quality is to be estimated, manufacturers will take care that the views of their customers are suited, by fair means if possible, and if not, by the

best imitation in their power. The true cure for the thing lies in the dissemination among the public of a better knowledge of the proper mode of estimating the quality of commercial articles generally, and in this particular case, by the knowledge of the fact, that nine times out of ten the desiderated colour is produced by a foreign dye which is generally adulterated, and sometimes with substances which may produce most injurious effects. The futility of the colour in valuing cheese is well known in the dairy districts; and I have been informed that in Cheshire annatto is only added to that which is to be sent to market, and when made for home consumption its natural colour is retained.

ON THE COMPOSITION OF NORWEGIAN FISH-GUANO.

About two years ago I published in the Transactions of the Society several analyses of so-called fish-guano. The substances in question had been produced on a small scale, and had not become regular commercial articles; and I remarked at the time that the reason for this was to be found in the high price charged for them, which materially exceeded their estimated value. This excessive price is mainly due to the elaborate patent processes by which they were made, and I expressed the opinion that the want of success which had attended their manufacture should only stimulate manufacturers to the contrivance of simple and economical processes. Since that time I have become acquainted with a kind of fish-guano made in Norway, which is now a regular article of commerce, and is exported from that country to Germany in considerable quantities. It differs from all the other fish-guanos I have seen in containing a large quantity of fish-bones, so that it is not merely a nitrogenous manure as they are, but contains a sufficient quantity of phosphates to make it closely resemble a true guano. The composition is as follows:—

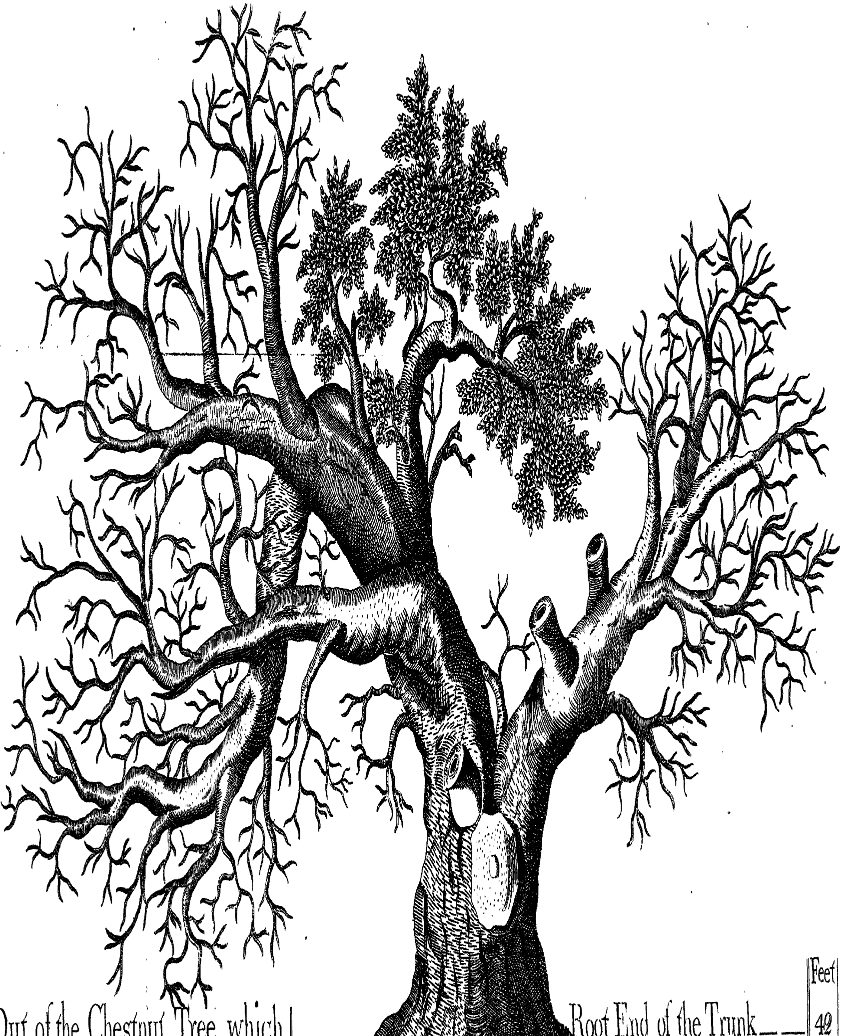
Water,	13.02
Organic matter,	49.40
Phosphates,	30.26
Carbonate of lime,	1.20
Alkaline salts,	5.89
Sand,	0.23
	100.00
Ammonia,	7.76

In the other samples of fish-guano I have examined, the phosphates have not exceeded 4 or 5 per cent, and the ammonia was about 7, so that this is a superior sample; but its price is high. I am informed that its cost in Hamburg, to which it has hitherto been chiefly exported, is £9, 2s. 7d. per ton, and it could probably be delivered in this country for about the same price. Now, calculated according to the usual principle adopted in the valuation of manures, it is worth only about £7 per ton. It must be observed,

however, that this method of valuation is not applicable to all manures. It gives very exact estimates in the cases of Peruvian guano and some other substances, but it does not give the full value of bones. Thus, for example, bones containing 50 per cent of phosphates and 4.5 of ammonia are sold at about £7, 10s. as dust, and £8 as meal, while their estimated value does not exceed £6, 7s. The fish-guano may in some respects be considered as closely similar to bone-meal, and its value is about 14s. per ton above it, so that it should be worth about £8, 14s. This is considerably short of the price at which it is sold, but still it is very possible that on particular soils it may be used with advantage.

Last year I obtained from the company by which this manure is manufactured a sufficient quantity for a field experiment, which I placed in the hands of Mr Scot Skirving, who reports very favourably of its effects. A very elaborate series of experiments has also been made by Dr Stöckhardt, Professor of Agricultural Chemistry at Tharand, in which its effects are compared with those of Peruvian guano. He finds that on wheat, oats, and barley, every pound of fish-guano produced an increase of 6.1 lb. of dry matter on the crop, as the average of twenty-five experiments, while the same quantity of Peruvian guano gave 6.3 as the average of twenty-three experiments. On potatoes and turnips, as the mean of seventeen experiments, the fish-guano gave an increase of 15.6 lb., and Peruvian guano 17.3 lb. of fresh roots. When, therefore, the difference in price is taken into account, it obviously bears a favourable comparison with Peruvian guano.

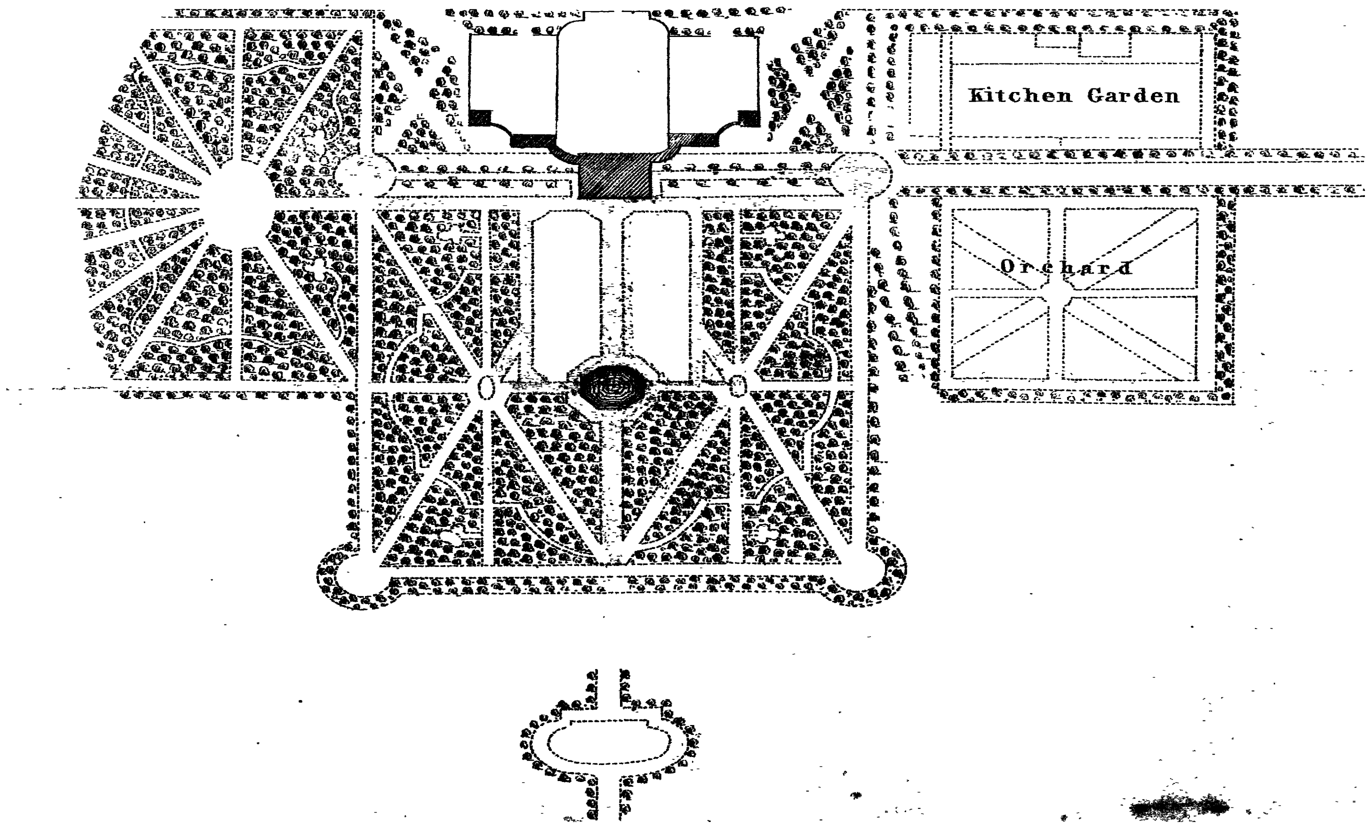
I am not acquainted with the nature of the process in use in Norway, but from the composition of the manure it is impossible to doubt that it must consist simply in drying and grinding; and I have all along maintained that this is the only method in which it is at all likely that success is to be attained. The manufactory in which it is made is on the Lofoden Islands; and after paying the freight from thence to Hamburg, its cost is little over £9 per ton. It must be remembered also, that owing to the high price of fuel, the cost of manufacture there will be much greater than in this country, and it is probable that a similar manure might be produced here at £7 per ton—a price the farmer would readily pay for it. It is much to be desired that the fish-curers of the British coast would direct their attention to this matter.

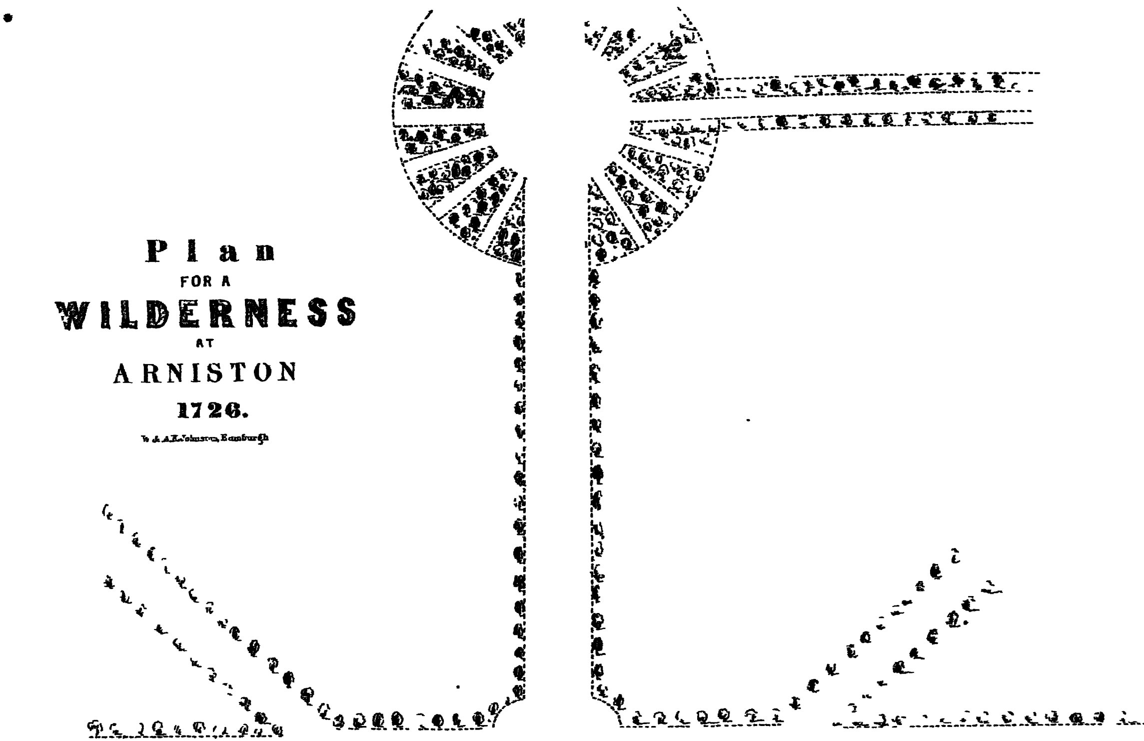


Out of the Chestnut Tree which grew at Finhaven in Angus Shire: whose dimensions as taken & attest:ed by ſeveral of the Justices of the Peace of the County, the 20th. April 1745. were as follows. (altho at that time the Tree had lost the great-est part of it's Bark, having ſuffered by the frost in Win-ter 1740.)

	Feet	In
Root End of the Trunk	42	8½
Middle of the Trunk	30	7
The Top where the Branches Seperat-	35	9
The largest Branche	23	9
The ſmallest ditto	13	2

W. & A. K. Johnston, Engravers & Lithographers, Edinburgh


Kitchen Garden
Orchard


Plan
FOR A
WILDERNESS
AT
ARNISTON
1726.
W. & A. K. Johnston, Edinburgh

ACCOUNT OF THE PERTH SHOW.

By R. Russell, F.R.S.E.

The success of the Highland Society's show this year at Perth, is but another step in the steady march of progress which has characterised the history of its meetings. Whether we take the stock or implement department, general advancement is met with, bespeaking alike careful selection in the breeding and rearing of animals, and a gradual perfecting of the machines used on the farm. We trust the next gathering at Perth will, on the whole, make as great an advance as this has made beyond that of 1852.

As on former occasions, the South Inch was chosen as a fit site for the show-ground. About 20 acres were boarded off betwixt the road and the river. The live-stock, occupying the north end, were lodged in substantially boarded stalls, which proved quite rain-tight during the repeated heavy showers that fell. The dairy-produce shed, committee-rooms, and fodder-yards being on the west, formed, with a little additional planking, a division between the live-stock and implements. This separation of the two departments enabled the one portion of the yard to be thrown open before the other. The division being removed on Wednesday at noon, gave the public admission to the whole yard. The implements in competition were seen in their classes across the grounds, and those in the extra and miscellaneous classes were scattered over the west corner, in the stands of the respective makers.

On Friday the 26th, and Saturday the 27th July, the implements were placed in their several sections. During the last of these days heavy and repeated showers fell, which rendered the duties of those in charge of the placing anything but agreeable. By seven o'clock on Monday morning, the Judges commenced their labours among the implements. The day was fine, but a slight shower fell at night. On Tuesday the awarding of the premiums was continued in the yard, and the ploughs were tried at Muirton, on a field adjoining the Dunkeld road. The trial of harrows, grubbers, and rollers, was continued on Wednesday. On both these days, the public were admitted to the trial field, and the ploughing especially was eagerly examined by considerable numbers.

The live-stock were all placed in their stalls and pens early on Wednesday morning, and by noon the Judges had completed their task. The public having been admitted to the implement department by seven o'clock, had time to run over the sections before the barriers were taken down, and getting the range of the whole yard. This arrangement, we need scarcely say, was of great moment to those who could only spend one day in the yards.

Only slight showers fell on Tuesday and Wednesday, and the

comforts of none were seriously interfered with. On Tuesday and following days about 1193 persons were admitted to the trial fields at 6d. each, and the sum realised was £29, 16s. 6d. There were 1960 persons who paid 2s. 6d. a head for admission to show-yard on Wednesday, yielding £245. Thursday being the principal day for the public, was luckily exceedingly fine, and the various means of locomotion seemed to be fully taxed to convey the crowds along the different routes. At a shilling a-head, £785, 15s. were drawn at the door, so that there must have been about 15,715 persons on the ground, besides the members who had free access to the Show during all the days. Friday was wet and disagreeable, which served to lessen the number of visitors. There were, however, £87, 6s. drawn, and at 1s. 1746 persons must have been on the ground. Large numbers of the farm-servants admitted at a low rate, availed themselves of this reduction. The total sum collected at the doors and trial-field, was £1147, 17s. 6d., against £841, 8s. for 1852, which shows the growing interest which the people of Scotland manifest in the exhibitions of the national Society.

On Tuesday evening Dr Anderson, the Chemist of the Society, gave a lecture on "Experimental Agriculture," in the Court House, which was well attended. On Wednesday evening, the banquet in the City Hall took place, under the presidency of the Duke of Athole. There were about 280 guests. This highly popular President kept the company in the best of humour; and those who have had occasion to come in contact with him during his term of office, regret that the stated period for his retiring is so nigh at hand.

The Society has again experienced a hearty welcome from the civic authorities of Perth, who did their utmost to render the meeting a successful one. A large amount of work devolved on the local committee, whose members spared no exertion to have the arrangements carried into effect. As far as we could learn from inquiries, all went on smoothly, and we found no grounds for complaint.

The statistics of the stock and implements in 1852 and in 1861, is so far useful as indicating the number of entries in the different sections.

	Cattle.	Horses.	Sheep.	Swine.	Poultry.	Dairy Produce.	Implements.	Premiums.
1852, . . .	313	135		50	186	123	339	960
1861, . . .	338	155	616	79	360	91	850	1500

LIVE-STOCK.

It is no easy task to write out even a general view of the merits of the most conspicuous animals in their several sections. One must

devote a large amount of time to do it with any satisfaction to himself, far less to those who have better opportunities, and devote special attention to certain sections. This year, however, we are glad to say, that in numerous cases the Judges have so far extended their reports, as to supersede more detailed accounts on our part. These we shall make use of as far as we have obtained materials. A few general remarks of our own, where these are awanting, will serve to fill up the broken links in the chain which, on other occasions, we hope to see more complete. It will tend to stimulate improvements in breeding, and diffuse information by obtaining a few hints from such men as are selected as judges. Tastes on this matter will ever vary; but we are all the better of knowing what qualities are most thought of, or deemed fashionable for the time.

SHORTHORNS.

There were eighteen entries of *aged bulls*, and, on the whole, they were only a middling lot, there being few really good animals. The prize animal, "Lord Raglan," although a useful bull, can scarcely be considered as first-class. An open or deficient space is observed at the false rib, owing to his narrow though well curved loins. This was his principal defect. The second prize was only moderate, and the third prize was much too long in the back for an animal of style. If Mr Reid had had his "Freemason" in better bloom, he might have obtained a much better place for so deserving an animal. Lord Kinnaird's "Lord John Russell," was a good animal, and has since gained the first position at the Royal Irish Society's Show at Belfast. Neither were the *two-year-old bulls* so strong in point of quality as they have often been at former shows. The *yearling* section contained a number of useful animals, but little more can be said of them. Mr Mitchell had a very promising animal. The placing of Mr Booth's two cows gave rise to a good deal of criticism. It was generally considered that the "Queen of the Vale" was entitled to be put before "Queen Mab," though the opposite view was taken at Leeds. The most of the other cows were by no means remarkable for quality. Among the *two-year-old heifers*, the "Soldier's Bride," belonging to Mr Booth, was generally much admired. For a two-year old, she looks something wonderful, but perhaps somewhat overdone, and there is a want of softness of skin and quality of flesh, as well as a slight deficiency in that peculiar elegance which ought to characterise the high-bred shorthorn. Mr Mitchell's "Mistletoe" was quite as smart as her more successful rival. Mr Douglas's "Rose of Cashmere" was less massive, but the quality of the flesh was fine. Mr Shepherd showed a useful animal, while the others in the section were but middling. Mr Douglas maintained his celebrity as a breeder by the three animals which took the first, second, and third prizes in the *yearling heifers*. The "Village Belle" was the favour-

ite; but all three were of one type, and showed a deal of elegance and breeding. The Duke of Montrose's "May Morn," is of exceedingly fine quality, but, strange to say, was not even commended, though a very general opinion prevailed that she should have got in before either of Lord Strathallan's valuable animals. This section, however, was distinguished by general merit, and was by far the best of the shorthorn class. Among the extra shorthorns, "Lady of Athelstane," the Dumfries premium cow, retained her fashionable looks; while the "Rose of Autumn," which stood on the show-ground at the former meeting in Perth, and has now seen thirteen summers, exhibited all the remains of a once stylish form.

The following welcome remarks from Mr Carr were received just in time to have them embodied in this report. Had they come sooner we might have dispensed with any criticism of our own:—

"Scotland, with her hardy and picturesque races of cattle—the Ayrshire, second to none in her yield of milk; the West Highlander, unequalled in the empire for the fine grain and flavour of his beef—has yet ever shown a decided predilection for English beeves.

"It is difficult to say at what period the shorthorn or Teeswater breed was first introduced. To the early importers—'good honest men and true, save for a little shifting for their living'—it is recorded that nothing wearing hoof and horn, and able to transport itself across the border, came amiss.

"It is probable, therefore, that the unimproved Durham must have had a footing in Scotland from the days when the stout Douglases of yore, sallying forth under the light of a Michaelmas moon, bore off their 'bows of kye'* from the rich haughs of the stately Tees, fetching many a compass to outwit the Saxon loons, to the more recent time when a Douglas, no less renowned for his cattle exploits, crossed the border with L.500 in his pocket, and carried back, at the tail of a steam-kettle, to his fastness in the Lothians, *ae bit fleckit cowie for a' that siller.*

"Scotland can now boast of many equally enthusiastic and successful breeders of this useful tribe of cattle, and a spirit of emulation in bucolic pursuits is abroad, which it is the patriotic object of agricultural societies to foster. The improved shorthorn is everywhere steadily advancing in the steps of improved agriculture and cattle-husbandry, and from many a craggy knoll in the far wilds of Caledonia the smart little kyloe looks wonderingly down on the lumbering usurper of his best feeding-grounds.

"It has been not unusual in reports on the exhibition of live stock to enumerate the points which a good specimen of each particular tribe should possess. The writer of these remarks some

* A "bow of kye" was twenty head.

time ago tried *his* hand at 'limning out a well-proportioned' cow, throwing each point into a doggerel line as an aid to the memory. He appends the sketch,* not so much from any satisfaction with his own performance—in which he feels that he has certainly sacrificed elegance to conciseness—as in the hope that some one more hardened in 'the sin of rhyme' may be induced to improve upon it, allowing perhaps two lines instead of one to each point. Let no man think such task unworthy of the muse—

> 'Such themes as these the rural Maro sung
> To wide-imperial Rome, in the full height
> Of elegance and taste by Greece refined.'†

In the Island of Jersey a fixed scale of points of the form, qualities, and appearance of a perfect Jersey cow has been agreed upon and established by the best authorities, as the standard and rule by which the judges at agricultural shows are to be governed in deciding on the relative merits of the animals before them.

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* PROPRIA QUÆ BOVIBUS.

> The following features constitute, I trow,
> The beau-ideal of a shorthorn cow:—
> Frame massive, round, deep-barrelled, and straight-backed;
> Hind quarters level, lengthy, and well packed;
> Thighs wide, fleshed inwards, plumb almost to hock;
> Twist deep, conjoining thighs in one square block;
> Loin broad and flat, thick-fleshed, and free from dip;
> Back ribs "well home," arched even with the hip;
> Hips flush with back, soft-cushioned, not too wide;
> Flanks full and deep, well forward on the side;
> Fore-ribs well fleshed, and rounded like a drum;
> Fore-flanks that even with the elbow come;
> Crop "barrelled," flush with shoulder and with side;
> Girth large and round—not deep alone, but wide;
> Shoulders sloped back, thick-covered, wide at chine;
> Points snug, well-fleshed, to dewlap tapering fine;
> Neck-vein filled up to well-clothed shoulder point;
> Arm full above, turned in at elbow-joint;
> Legs short and straight, fine-boned 'neath hock and knee;
> Belly cylindrical, from drooping free;
> Chest wide between the legs, with downward sweep;
> Brisket round, massive, prominent, and deep;
> Neck fine at head, fast thickening towards its base;
> Head small, scope wide, fine muzzle, and dished face;
> Eyes prominent and bright, yet soft and mild;
> Horns waxy, clear, of medium size, *unfiled;*
> Tail fine, neat hung, rectangular with back;
> Hide soft, substantial, yielding, but not slack;
> Hair furry, fine, thick-set, of colour smart;
> Udder well forward, with teats wide apart.
> These points, proportioned well, delight the eye
> Of grazier, dairyman, and passer-by,
> And these to more fastidious minds convey
> Appearance stylish, feminine, and gay.

† For the benefit of the Scottish farmer, I append the Roman poet's idea of a choice heifer:—

> "First by these marks select thy mother cow—
> A clumsy head, broad neck, and lowering brow;
> Let double dewlaps from her chin descend,
> And at her knees the ponderous burden end;
> A bull in face, that lofty in her gait
> Trails on the ground her tail in sweepy state."

These points, with a clear definition of what constitutes each, and the number of marks it is to count in favour of the animal possessing it, are arranged in a tabular form for the use of the Judges. The adoption in our own agricultural shows of this system (which has worked well in Jersey for the last twenty years) was recommended by Mr Chrisp, about a year ago, at a meeting of the Newcastle Farmers' Club; and it certainly appears to the writer that, if it were possible to establish similar recognised rules for the judging of shorthorns, the application of which would not be attended with the same difficulty in the case of *fat* cattle as of lean, the decisions might probably assume a less arbitrary and inscrutable character than they now too frequently do, so much being left to the individual opinions or caprice of the Judges. They would certainly give more confidence and satisfaction to the exhibitors. Might we not have a '*sliding* scale,' which would indicate the number of marks merited by each point, according to the degree of perfection in which it was possessed? Of course in every class a large proportion of second-rate animals might, without any unfairness, be weeded out before subjecting the remainder to this test.

"With the exception of three animals belonging to Mr Booth of Warlaby, the shorthorns shown at the Perth meeting were all the property of exhibitors north of the Tweed. The sections in this class contained one hundred and four entries, of which fifty-one were bulls.

"*Section* 1. Bulls calved before 1st Jan. 1859, eighteen entries. —This was a very creditable class. The first prize was awarded to Mr Cruickshank's eight-year-old bull, 'Lord Raglan,' bred by Mr Stewart of Southwick. This animal is by the well-known bull 'Crusade,' and from a cow of the Booth blood. He is remarkable for his strong, well-fleshed loins, good quarters, and well-laid shoulders, though now a little wanting in fulness of crop, flank, and forerib,—shortcomings which may fairly be attributed to his advanced age.

"The second prize fell to Mr Campbell of Kinnellar for 'Scarlet Velvet,' a level, even-fleshed bull, of great substance, but with not quite so much shorthorn character as his more successful rival.

"The third prize bull, the property of Mr Home of Argaty, is a majestic-looking animal, with a very stylish contour and a grand imperial front. His neck was well sprung, and his shoulders perfect, with the space behind the elbow beautifully filled; but the forerIbs were wanting in expansion, and the loin in strength. The eye, too, was 'retreating.'

"Mr Reid of Cruivie and the Earl of Airlie showed two very useful animals in this class, both by bulls of the Booth blood. The former, 'Freemason,' did no discredit to his eminent breeder, Mr Torr of Aylesby. He had much style, and a good breast and shoulders, but was rather wanting in flank and flesh generally. The

latter, 'Young Ben,' but for a pair of somewhat upright shoulders, was a useful animal of true proportions.

"There were several animals in this class which, though dignified with the name of shorthorn bulls, were entirely wanting in the distinctive characteristics of the tribe. In their black red or brown colour, in their vulgar heads and horns, and round pig thighs, some of them were more like mongrel Herefords than shorthorns.

"*Section* 2. Shorthorn bulls calved after 1st Jan. 1859, thirteen entries.—This was a very indifferent class. The first prize animal, Mr Anderson's 'Emperor,' and the second, the Duke of Montrose's 'Victor Royal,' were so evenly matched in all respects, that they may be described together. Both were remarkable for their lengthy, well-packed quarters, strong loins, and neat shoulders; but both were deficient in development of muscle in the lower part of the thigh (where butchers look for what they call 'the small rounds of beef'), and both wanted a little more flesh on the loin. It became a matter of some difficulty to award the palm, and a slight advantage in the length of quarter and covering of the hip decided the doubt in favour of Mr Anderson's, though the second prize was perhaps the more stylish animal.

"Mr Marr's bull 'Sir Hubert,' by 'Sir James the Rose,' was awarded the third prize. He was a thick, useful bull, with capital loins and quarters, but deficient in girth, and with a somewhat coarse horn.

"Though, in conformity with the regulations, the Judges were obliged to mark with commendations two others in this class, to provide against the contingency of any disqualification of the prize animals, there were really no others worthy even of that distinction. Their deficiencies were chiefly those of girth and loin.

"*Section* 3. Bulls calved after 1st April 1860, eighteen entries. —This was not by any means a meritorious class. Mr Balfour's bull, 'Great Seal,' was the best of the lot, though too upright in his shoulders, and wanting depth of twist. The second prize, Mr Stirling's 'Forth,' was a bull of great substance, with splendid loins and flank, but deficient in depth of girth and flesh beyond the loins. Mr Turnbull's third prize bull 'Snob,' though in great condition, wanted flesh, where some of the most valuable flesh should be, on his back. Mr Home's bull, 'Vandyke,' had a good loin and flank, and very stylish outline, but his hair was harsh, his head set on a little too low, and there was a flatness about him generally, which, however, time may correct.

"*Section* 4. Shorthorn cows of any age, thirteen entries.—This was a very superior class. The first and second prizes were awarded to Mr Booth of Warlaby, for two cows which may be considered models of the *utile et dulce* in the shorthorn. 'Queen of the Vale,' the winner of the first prize, though in only moderate condition, is a cow of faultless proportions, a perfect parallelogram in form, with

well-fleshed, obliquely laid shoulders, a good head, and very sweet neck and bosom, sweeping finely into the shoulders, the points of which are entirely hidden by the full neck vein. 'Queen Mab' is, if possible, still more remarkable than her sister for her broad, thick, level loins, depth of twist, and *armful* of flank; but she is now, perhaps, less faultless, as her hindquarters are becoming plain and patchy from fat. She is, however, equal, if not superior, to 'Queen of the Vale' in her marvellous capacity of girth, forerib, and bosom. Like her sister, she maintains her cylindrical proportions wonderfully throughout, the ribs retaining their circular form up to the shoulders, with which they blend without any depression either at the crops or behind the elbow; and from thence the fore-quarters taper beautifully to the head.

"Next to 'Queen Mab' came Mr Ainslie's 'Milkmaid,' a noble cow, with girth and forequarters rivalling in excellence those of 'Queen of the Vale' and 'Queen Mab,' but with a little too much of the old-fashioned prominence of hip. Lord Strathallan's cow 'Pearl,' which was highly commended, had exceedingly fine shoulders and fore-end, but in addition to a little slackness of the back, possessed, like Mr Ainslie's cow, hips too round and prominent, an objectionable conformation, because always accompanied with a hollowness between them and the tail-head, and a consequent loss of valuable beef.

"*Section* 5. Shorthorn Heifers, calved after 1st January 1859, fifteen entries.—There were many animals of great merit in this class. Foremost and fairest of the train came Mr Booth's milk-white heifer 'Soldier's Bride.' To describe her would be but to recapitulate all that the writer has said of 'Queen of the Vale' and 'Queen Mab;' and she is, in fact, too well known to fame

'To need the painted flourish of his praise.'

It may be doubted whether any shorthorn ever attained to such ripe maturity, and carried so heavy a weight of firm elastic flesh at the same age; and yet it has been somewhat illogically objected to her, that she wants that 'quality' which indicates capacity to fatten. Mr Mason of Chilton used to say, 'Give me the man who can breed them with good fore-quarters;' and assuredly the world might be challenged to produce three animals with bosoms so massively yet symmetrically formed as 'Queen Mab,' 'Queen of the Vale,' and 'Soldier's Bride.' The second prize, Mr Mitchell's 'Mistletoe,' by Mr Booth's 'Welcome Guest,' was a very beautiful heifer spoilt by over-feeding and want of exercise—her legs shrinking and bending inwards under her weight of flesh. But for this, and perhaps a little want of flesh on her neck, she would have been very near perfection—her fore-quarters, loins, hind-quarters, twist, and ribs, being faultless. The third prize, Mr Douglas's 'Rose of Cashmere,' was a heifer of great promise, with a rare

broad loin, even with the hip. Mr Shepherd's '7th Kora' was also a good animal, but not of the same character as the preceding ones, and deficient in fore-flank and breadth and flatness of loin.

"*Section* 6. Shorthorn Heifers, calved after 1st January 1860, twenty entries.—This was a good class. Mr Douglas here bore off all the laurels. The first prize was awarded to his heifer, 'Village Belle,' by 'Sir James the Rose,' and from a cow of the Bates blood, dam of 'Lady of Athelstane.' This was an exquisite little heifer—the very mould and mirror of shorthorn form and fashion. Her neck vein was wonderful—so also the fulness and depth of her thigh. 'Village Belle,' if she fulfil the promise of her youth, is assuredly destined to more than a village fame.

"Next came Mr Douglas's '2d Isabella Rose,' with a very pretty, gay fore-end, and a lovely little front that bespoke her gentle lineage. Her fore-rib was wonderfully good—her only failing in the hind-quarters, the tail-head being rather elevated above the line of her back, which always causes the sides of the quarters to slope.

"These two heifers are good specimens of the sort of animal which it has been Mr Douglas's aim to produce—compact and massive rather than large, and growing a heavy weight of flesh on the least quantity of bone, and in the least compass—his opinion being that such animals yield a heavier weight of flesh, in proportion to the food consumed by them, than animals of larger frame.

"Mr Douglas also received the third prize for his 'Lady Blanche,' a good heifer, but not so stylish as the other two, and wanting development of girth and fore-quarter.

"The Earl of Airlie received a high commendation for *his* 'Lady Blanche.' Though in poor condition, and with rather harsh hair, she was very straight and stylish, with a breast coming very prominently out. The Duke of Montrose's 'May Morn' had beautiful shoulders, and was nicely fleshed behind the elbow-joints, but wanted a little expansion in the fore-rib and fore-quarter generally to make her a first-rate heifer.

"Extra Shorthorn, three entries.—In this section Mr Douglas showed his well-known prize-winning cow, 'Lady of Athelstane,' which was very highly commended. She unites, what is rarely met with, great length with good loins, and is wonderfully cylindrical and even-fleshed throughout. Her hind-quarters are perhaps her least perfect point, though *they* would pass muster in a less perfect animal."

THE POLLED CATTLE.

In most of the sections of polled cattle the Angus and Galloway were shown together. This arrangement had an odd sort of an effect, inasmuch as the finer touch and more elegant forms of the Angus did

not correspond well with the rougher characters of the Galloway. No doubt, many fine specimens of the latter were shown, but the two breeds stood in greater contrast than ever towards each other. We are glad that Mr Arthur Glennie, Fernieflat, one of the Judges in this section, has the following observations on this point: "The Judges of the polled cattle wish to represent to the Directors the extreme difficulty they had in awarding the premiums in those classes where the polled Angus and the Galloways competed together. Being in reality distinct breeds of cattle, a coloured West Highlander might just as well compete in shorthorned class. I would humbly suggest that, in future competitions, there should be a distinct class for Angus, and not mixed up with the Galloway. I am sure such a course would give great satisfaction to exhibitors in both classes, while it would save the Judges a most difficult and often invidious duty."

We willingly lay aside any further remarks of our own on the character of the polled stock, seeing that one so eminently well qualified has reported on this breed. Mr Watson of Keillour expresses himself as under: "Most of the animals shown for competition in this class were of very superior quality, and did credit to the skill and judgment of the breeders. It was remarked that had some of the unsuccessful animals been in the same condition of fatness as those which gained the prizes, the competition would have been very close, and some of the competitors might have changed places. As it was, the Judges were more inclined to favour some animals which appeared in a more likely state to continue breeders, than to give prizes to those which, from being overfed, they had doubt that they might give up breeding. But under the rules of the showyard, the Judges felt bound to award the prizes to the best animals of their class as immediately brought before them—presuming these to have complied with all the existing rules of the Society.

"These remarks apply to males as well as females, and has long been a difficult point to deal with in public competitions—tendency to fatten being a desirable quality when combined with others in all breeds of animals, and not easily discouraged by the promoters of public exhibitions.

"In the class of *Aged Bulls*, a Galloway bull was shown in competition with the Aberdeen and Angus. This animal was much admired for his masculine character. He stood the test of competition well, being equal in many points to the best in the showyard. But his quality or touch came short of the more cultivated, and perhaps more pampered specimens of an early age shown against him. It was confidently urged, that an infusion of the Galloway blood might tend to improve both breeds, by careful, gradual, and judicious crossing, through Galloway bulls and Angus or Galloway cows, or *vice versa*. This experiment can be conducted

successfully only by a very experienced and highly qualified breeder, and should not be attempted by an amateur in the art."

AYRSHIRE CATTLE.

Both the numbers of Ayrshires have been greater, and the competition has often been closer, yet the prize animals were generally fine specimens of the breed. Among the *bulls*, Mr M'Kean's four-year old was much admired. This was a lovely animal, and his weak points were few and difficult to detect. His horn, if anything, rather too small considering his large size, which, however, did not disguise the breeding he showed in every quarter. The Duke of Athole's animal, bearing the second prize, was of a famous colour, but from the top of the tail to the shoulder defects were apparent. The fine head and horns were the redeeming points. The *one and two year old bulls* were middling as to quality. Both Mr Campbell and Mr Guthrie, who, acting as Judges, called the attention of the Directors to the classification of these sections, while considering all the arrangements of the show, so far as they observed as otherwise perfect, recommend "that the two-year-old and one-year-old bulls be in future shown in different classes. As many bulls change much between one and two years old, the Judges would make the award with greater satisfaction, were two sections made instead of one as at present." There was a fair show of *cows*, but the *two-year-old heifers* formed a superior section. The Earl of Strathmore's was a rare animal, so perfect in most of her points and so handsome. The Duke of Athole's aged cows having been prize-takers at Glasgow and Edinburgh, made a good wind-up to the Ayrshires.

HIGHLAND CATTLE.

It had been well known for some time previous to the meeting, that great exertions have been made among the breeders of this class, to make a good display at Perth. In this few can say they have been disappointed; almost all the famous breeding spots of this race sent forth its quota. The wild but subdued appearance of the cultivated type of Highlanders, shows what care and skill have done. With a touch and a frame, which the shorthorn only excels, and covered with a flowing coat of hair of many colours, the wide spreading horns are the only parts which seem to defy all control in their wanton growth. Indeed the fine specimens were too numerous to notice specially. Mr Menzies, of Chesthill, Aberfeldy, in reporting for the Judges, remarks—"The Judges of Highland cattle beg specially to report to the Society, their high opinion of the quality of the large number of the stock exhibited. The cattle exhibited are superior to any shown at many previous shows of the Society. This remark more particularly applies to the aged bulls and three-year-old heifers."

FAT CATTLE.

The various sections of fat stock all contained animals of considerable merit. Mr Mitchell's three-year-old white cross-bred ox was clearly the great attraction in this division of the Show. Mr Syme's two-year-old crosses were wonders for their age. The highly-finished and beautiful Highland ox, belonging to the Marquess of Breadalbane, had many an admirer. As showing the results of care in selection, we believe this ox was out of the same cow as the handsome two-year-old heifer that took the prize so easily in her section.

ALDERNEY AND BRITTANY BREED.

Both these breeds were represented. We are becoming better acquainted with the latter, and all cow-fanciers are pleased to see spare corners of the yard filled up with so fine specimens of this diminutive race of cows.

HORSES.

We are always loath to believe that the different districts in which the Highland Society holds its shows, do their best in turning out cart-horses. We have again to report only a middling lot. The prize *aged stallion* was a powerful animal, but neither remarkable for symmetry or other qualities, except immense strength. The hock and other joints were rough, and otherwise quality was wanting. The second premium was much more handsome, and also exhibited more bottom, but it was too small sized. The *three-year-old stallions* were superior to the last section. The prize animal was in every way so well furnished that he looked like a six-year old. The *one and two year olds* did not show well, and few superior specimens could be pointed to. The *mares in foal and mares with foal at foot*, contained some strong and active beasts. In the other sections mediocrity was the rule, anything particularly good the exception.

BLACKFACED SHEEP.

The blackfaced sheep were not far behind the Highland cattle in general excellence. There were twenty-six entries of *aged tups.* The most of the more celebrated breeders from the north, south, east, and west, did their best to gain a place in the premium list. The competition in all the classes was exceedingly close. It is evident that the peculiar class of sheep bred by the Murrays, is gaining ground and becoming fashionable. Their seemingly more delicate constitution and more perfect shapes, are evidently to be fully tested on other runs than their own. Long may this hardy breed of sheep have such men as Murray, M'Laren, Drife, Campbell, Bryden, and Archibald, to bring out and mature its capacities for improvement. We are glad to have the testimony of J. S.

Stewart, Esq. of Coll, a Judge on the Highland sheep:—"I have nothing to suggest that I consider would at all improve the arrangements of the department in which I acted—they appeared to me quite perfect. The sheep taken as a whole were the best I have ever had to judge, and therefore we found it a difficult matter to get over our work."

CHEVIOTS.

As expected, this breed did not at all come up in point of numbers to the Show at Dumfries last year. The exhibitors, however, were all from the south, and the specimens were mostly very choice. But although the numbers were not large, the Judges, we have been informed by the attending members, had their own difficulties in awarding the premiums, as the merits were so equally balanced.

LEICESTERS.

We are glad that we are enabled to give some remarks on this breed, by Mr Melvin, Bonnington, who acted as attending member.

"The show of Leicesters, in all the different classes, has never been equalled at any former meeting of the Society. Finer, handsomer, and more complete sheep have carried off the first prizes at former shows, but the average of all the former in general excellence never reached that at Perth. In the section of aged tups, the animal placed first was four years old, bred by Mr Roddam of Roddam, and for his age was a good example of the breed. Mr Simson of Blainslie took the second place with a ram which had his points well developed. Mr Reid, Waukmilton, followed with a gay coated two-shear well prepared. In this class also, the first prize shearling at Dumfries was commended, he being almost the only pure bred Midland Leicester in the lot—the others either entirely or partaking largely of the Border blood. The *shearling tups* were fifty-nine in number, and presented a very level lot. The Judges having examined each sheep separately, ordered twenty-four out for further inspection. After reducing this number for further inspection to eleven, they then made a stand, and had great difficulty in rejecting other six, two of the best of which they noticed as being worthy of remark. The first sheep was bred by Mr Beattie of Newbie House. It was evidently differently bred from those with which he was successful at Dumfries. In size and appearance it was much more akin to the whitefaced, a few blue spots showing there had been a mixture of blood. In this section the remark may also be made, that no such lot as a whole was ever shown at any of the former meetings of the Society, although more perfect specimens have been so. Of *ewes* there were fourteen lots, and several of them were in very high condition, much too fat to be useful for breeding. Those which had

prizes awarded were as much so as any. It is no easy matter to draw the line of distinction between fair breeding condition and over fatness, but certainly both as regards ewes and gimmers, many were over fat. The gimmers were capital, of large size and very equal. There were nineteen lots, of which nine were taken out of the pens for further comparison. The ewes and gimmers were of the whitefaced class, Mr Collie's lots of ewes and gimmers being the purest of the blue-headed breed, but his ewes only were commended."

LONG-WOOLLED OTHER THAN LEICESTER.

"There was a fair show," Mr Melvin writes, "in this class of sheep; but neither in size nor symmetry was it superior. Only twenty lots were shown for twenty prizes and commendations. Many persons, with just cause, remarked on the absurdity of thus distinguishing a class which had only eight breeders and six exhibitors there to represent it. The Society devotes £54, besides medals, in fostering this select breed, being about £11 to each of those parties who usually exhibit. Are the results worthy of such expense?"

Mr Melvin states the case very forcibly. For our own part we have always looked on the large long woolled sheep as interesting additions to the show-yard. Size in sheep is much sought after at present for the best arable districts. Some parties think that the Cotswold breed, or its crosses, under certain circumstances, might advantageously supersede the Leicester. We would be inclined to urge the Society to hold out a moderate encouragement in the way of prizes. If the experiments are successful, the breeders deserve some acknowledgment for their services, and if unsuccessful, they equally do so for the expenditure incurred in endeavouring to benefit the country. Indeed, the breeders of long-woolled sheep may point to the liberal manner in which the

SOUTH-DOWN SHEEP

are dealt with. There were only four exhibitors at Perth of this description of sheep. Though they do not seem to take kindly in Scotland, yet the encouragement the Society holds out in the matter of premiums, keeps them before the public, and new breeders arise. No doubt, Mr Skirving and the Duke of Richmond running so close a race, tends to keep back others who have useful animals. We are glad to be able to add Mr Watson of Keillor's report of the south downs.

"The pens of this class of sheep gave evidence that the Scotch breeders had gone to the best sources for procuring the most approved breeds in their native country. The premiums were closely contested—the Duke of Richmond's flock maintaining the ground it has for some years occupied at the Highland Society's shows, as winner of the first prizes. The competition, however, was well

sustained by the breeders of this valuable class of sheep from the Lothians, with the robust and heavy woolled animals which they exhibited. As this breed of sheep is rapidly spreading over the dry light pastures of the north of England and Scotland, taking the place of Leicesters on light soils, and of cheviots and blackfaced on the lower mountains of the midland counties, they are well deserving of the encouragement of the Highland and Agricultural Society of Scotland at future exhibitions."

SWINE.

There was a tolerable display of good animals in most of the sections. The entries of the small breed were more numerous than the large. It is somewhat curious that there were only five exhibitors of pigs from the county of Perth, which does not say much for the breed throughout the district. The fact is that the improving of the breed of pigs often goes on very slowly, as they are more troublesome to transport than almost any other of our domestic animals. In general, too, in the best arable districts of Scotland, the pig is merely reared as a save-all, and less care is bestowed upon its management.

POULTRY.

The most famous breeders of this description of stock in the country rendered the whole a most attractive collection. Mrs Fergusson Blair, Inchmartin House, showed so many fine specimens, that she has gained fame in the showyard, as well as in the literature of hen-management. Mr Muirhead of Edinburgh, writing for himself and other Judges, remarks :—" In all the more important or useful classes, the fowls showed a great improvement in the breeding, and they were all without exception of first rate quality, some of the pens possessing extraordinary merit. In the section for young dorkings, the prizes were very closely contested, and this section may be said to have been the best of its kind ever shown in Scotland. The sections in which the competition was not so close, were those chiefly of an ornamental description, and it may be accounted for by the season at which the show takes place, as at that time all fowls are in bad feather, and the fancy classes in particular show badly. In the sections for turkeys, geese, and ducks, though the competition was limited, the pens were all of a superior class. We are sorry to see no section for the *Scotch grey breed of fowls*. They possess excellent properties both for table and for eggs, and, altogether, they are by far the best suited for this climate. In the west of Scotland this breed is often shown even in larger numbers than the dorkings. Formerly this breed was shown at the Highland Society meetings as *Hamburg*, until the introduction from England of the fancy varieties known as the gold and silver pencilled and spangled *Hamburg*. As the fancy sections are so very poorly filled, some of their premiums might be

curtailed and given to the really useful class of Scotch grey. A prize might also be given to the best cross-bred fowls. It would be a great improvement if all the poultry could be placed under cover of a shed in the yard."

DAIRY PRODUCE.

Of dairy produce there was only ninety-one entries—the samples were few, and the general quality was nothing to boast of. The rearing of sheep and cattle seems to be more in keeping with the spirit of farming in the district, than the making of cheese and butter. Mr Francis Richardson, one of the judges in this department, writes:—"I was much disappointed in the produce of the district in cheese, and, but for the specimens from Wigtownshire and Lanarkshire, I would have objected to any prizes being awarded; even in butter there was no improvement; some of the samples were good, few of them extra fine. In this branch of dairy produce I expected something better, as at one time Perthshire was famous for its butter. They are either standing still and other districts going ahead, or they are retrograding. Unless they send their dairymaids into Ayrshire or Galloway to take lessons in cheese-making, they had better give up the attempt, for they are fifty years behind in this branch of dairy manufacture. This is the more to be deprecated, now that in several parts of Scotland the cheese is equal to any made in the finest districts of England, and in foreign markets takes precedence of English. This is a gratifying fact, and the Highland Society deserves much of the merit of this improvement. I was much pleased with the whole arrangements."

IMPLEMENTS.

As has been the case for some years, complaints were again made at Perth regarding the manner in which the implements were arranged. Mr Robert Patterson, Offers, one of the judges of implements, having had good opportunities of learning how the matter rests, writes on this head,—"Some of the Scotch and all the English makers that I met with expressed dissatisfaction at the present plan of arranging the implements, and at the want of covered sheds for their collections."

The whole subject has already been so fully considered and discussed by a special committee of the Society in 1859, that, for our own part, we are much averse to again touch upon it. In regard to the last point adverted to by Mr Patterson, we can see no good grounds for refusing the implement-makers covered accommodation, if they choose to pay for it. Canvass-covered sheds would no doubt have the effect of giving the yard a more imposing and complete appearance, and, besides, add greatly to the comfort of exhibitors.

As to the arranging of the implements, the wants and wishes of visitors and of exhibitors certainly do not harmonise. We think we state the truth in saying that ninety-nine out of every hundred visitors, whether from our own country or from foreign parts, greatly prefer the system adopted by the Society—of having harrows placed beside harrows, and ploughs beside ploughs, &c. It is quite distracting and unsatisfactory to hunt through general collections for the examination and comparison of implements. A great waste of time is the result. It is all very well for those who can afford to spend some days in the show-yard, to go with catalogue in hand and make the most minute inspection. But it must be kept in mind that the vast majority of visitors have only a limited time to make the round of the show-yard. The most complete and indexed catalogue would not assist them much. All wish to see what improvements are taking place in the manufacture of the various implements of the farm, and in no way can this be done so thoroughly or so quickly as by examining the implements as they are arranged by the Society.

No doubt it entails great inconvenience to the implement-makers having their articles distributed over the yard, classified in the different sections. Their complaints may be well enough founded. There is no compulsion, however, on the part of the Society, to make them enter their articles for competition. Exhibitors, therefore, may, if they choose, show implements only in their stands, and decline to undergo the disadvantages of the present system. So long, however, as the Society holds to its functions of awarding prizes for certain classes of implements, we do not see how they would be attending to the interests of the public but to follow the present system of classification. As Mr Patterson suggests, exhibitors must just show duplicates of the implements they enter for competition, and let all their implements have the numbers of their stands affixed to them.

Competitors have increased so largely within a recent period that the trying or testing of so many implements has become too laborious to have them, every class, done once a-year. Certain descriptions of implements are now omitted in particular years. This of itself encourages the stand system, which forms so attractive a feature of the show-yard. The Directors of the Society might easily throw a heavy load off their shoulders by giving no premiums for implements at all. The show-yard might be in every way as well filled, but we think that the thousands who can only pay a flying visit to the grounds would not reap half so much instruction as they do at present, were the mode of classification materially altered.

We are by no means sanguine that, although the implements were all placed at the Society's shows as the makers wish, it would materially increase the number of entries. Such a display of implements as were seen this year at Leeds we have really no wish

to see on this side the Tweed, for the simple reason that our field is by far too limited. A vast number of the implements at Leeds were almost exact copies of one another. It requires a far wider and more fertile field than Scotland affords to find customers to so many firms having large capitals employed in the manufacture of agricultural machinery. More than one of the English firms are at present manufacturing as many ploughs a-week as would furnish the whole Carse of Gowrie with new ones. Implement-makers, when in sight of the Grampian range, must be moderate in their expectations of the number of implements they are likely to sell. Some large firms spend about L.1000 a-year in exhibiting implements at the Royal Agricultural Society's meetings. We can scarcely afford to hold out encouragement that such expenditure would be a profitable investment in the north. One representative of a large firm in the south informed us, that for every machine he makes for Scotland he makes a thousand for England. Yet he meets with sufficient encouragement in the way of sales, and more especially by obtaining prizes, which bring his implements into notice, to be a constant attender at the Society's meetings, always competing for premiums when an opportunity is presented. So long as the Society's yards are not overcrowded with articles, we think it advisable to classify them as far as possible as at present, and make the premium list as large as is consistent with having trials properly made. The "stand" mode is a sort of necessary evil incident to large and general collections. The testing and trying of implements, however, is the real besetting difficulty of societies, and to what extent they may have ultimately to escape from it, if the number of articles go on increasing, and have to adopt the mere bazaar style of exhibition, we are at a loss to guess.

PLOUGHS.

There were thirty-eight entries of *Two-horse Ploughs for General Purposes* competing for the premium. The most of the celebrated Scotch makers were on the list. Page of Bedford, and Hornsby of Grantham, south of the Tweed, showed capital varieties of their high-class implements. The whole section exhibited good workmanship and finish. Besides these, Howard had specimens of his ploughs, with all his latest improvements, lying at his stand: seemingly content, however, with the laurels which he has formerly won on the trial-field, he did not appear at Muirton. Out of this large number of ploughs ten were selected for trial. It has been the usual practice to make the judges take out the best-looking ploughs from the lot. This, however, is by no means a very satisfactory task, as it is almost impossible to Judge of the merits of a plough until it is seen at work. Some of our plough-makers are but small capitalists, and after having been at the expense of frequently coming long distances, it might be advisable to give all

a trial who desire it. This might be done at little more additional trouble than under the present arrangements. Less land might be allowed to each plough at first, which would be perfectly sufficient to reduce the number so as to make them manageable. A few of those which were doing the best work might be then placed side by side, and their qualities more readily compared.

The soil of the trial-field at Muirton was quite a contrast to that of either Edinburgh or Dumfries. It was in every way well adapted for bringing out those points of ploughing which are desirable where broadcast sowing of grain is followed. The soil consisted of a rich alluvial clay, strong and retentive, but, owing to the rains, rendered as pliable and easily turned over as it usually is in February.

Hornsby's plough, soon became the favourite among the onlookers. That anything could be more regular and perfect than the cutting, and the crest which it made in the hay stubble, it was difficult to conceive. Allan's wheel-plough, however, was not far behind, and its lighter form, and more simple means of attaching the wheels, were altogether more in keeping with Scotch taste. Ponton's swing-plough was well held, and made a good furrow.

The size of the furrow in all was 6 inches in depth by 8 in breadth. In applying the dynamometer, Allan's wheel showed an extreme lightness of draught, the average being slightly above $2\frac{1}{2}$ cwt., while Hornsby's indicated $3\frac{1}{4}$, and Ponton's $3\frac{1}{2}$. This result, no doubt, had considerable influence in the decision arrived at by the Judges. Hornsby's plough, also, did not work so satisfactorily on the broken land as on the hay-stubble.

To us it appeared that Hornsby's seed-furrow was better packed than Allan's, and the furrow-slice was, besides, a little larger. It would have been an interesting point to have ascertained in what way the increased traction required by Hornsby's was expended. In all probability it was in the packing, for it is difficult to see how it could be in the mere cutting and turning of the furrow.

There were six entries for *Deep-furrow or Trench Ploughs*, all substantial articles, requiring an immense power to work them. *The Subsoil Ploughs*, so-called, whether for two or more horses, have cast aside the plough form and assumed that of the grubber. This shape enables the subsoil to be stirred at much less expenditure of draught than by the heavy naked plough.

The Double Mould-board Ploughs numbered eleven specimens, all highly finished. The great majority had the mould-board bare or awanting below—the prize implement was of this description. This form renders less draught necessary, but does not loosen the earth in the bottom of the furrow, nor bring it up. Page, Kirkwood, and Ponton exhibited good ploughs, having the boards suited to clear out the bottom of the furrow, and not to bring it up so high and sharp on the top. These ploughs are much more

suitable than the others for earthing up potatoes. Indeed, when either Page or Ponton's ploughs become so much worn in the mould-boards as to make a furrow anything like the others, new ones would be necessary. We need not speculate as to the causes which have led to the prevailing forms, but we are much mistaken if there should not be a change before long in regard to this fashion.

Of *Ribbing Ploughs* there was a good assortment; and the greater attention that is now given to the culture of oats is rendering these ploughs more sought after. All the specimens were good.

GRUBBERS OR CULTIVATORS.

There were thirteen entries of *Cultivators* or *Grubbers*. These did not show any marked improvement over the same class exhibited at other meetings of the Society. If we are not mistaken, it was at the Perth Show in 1852 that Tennant's grubber was first brought prominently into notice. It was thought that a happy riddance was effected in discarding two wheels, making one do as well as three, and rendering a grubber capable of being worked easily by two horses. The defects of Tennant's grubber with one wheel in front are too well known to practical men to require mention here. But a cursory glance at this section at Perth shows that the Scotch makers are rather going back to the heavy style of cultivators, and in this description of implements there is really no occasion for such. Almost the whole lot were too heavy for two horses working them. If possible, grubbers should be made for two horses, and the tines or prongs should not be made over-heavy. Heavy tines require that the whole implement should be strengthened, and the weight is, as a necessary consequence, soon unduly increased. More horses are required to draw it through the land; and when a tine touches a land-fast stone or other obstruction, the additional horse-power is all thrown up on it, and, as might be expected, it yields to the strain. Those who have many boulders within reach of the plough sometimes go on strengthening the tines by adding more material, and likewise by stays. This requires more horse-power, but it is found difficult to make a tine sufficiently strong for the weight of four powerful horses, and a heavy-working implement is the result.

There are two grubbers or cultivators which, we were sorry to see, were not on the show-ground—Colman's and Bentall's. There are vast numbers of these implements manufactured, and it is rather striking that they were not exhibited. These perform a description of work that none of our own have any pretensions to. Neither was the trial-field at Muirton adapted to bring their particular merits into notice. Had the land been baked by drought in spring, then those implements would have shown their useful qualities in assisting to reduce the land to a fine mould. The damp and clammy

state of the soil of the trial-field was not so well suited to exhibit the merits of grubbers.

NORWEGIAN HARROWS.

There was a capital show of these useful implements, which bid fair to supersede the roller as a pulveriser. The functions of the two are quite different—the Norwegian harrow doing its work while the land is slightly moist or in a green state, while the roller pounds and grinds it down after it is somewhat hardened by drought. We need scarcely say that the one must do this more economically than the other. Last year, at Dumfries, one-half of the circular tines revolved on the axles, whereas this year the axles are all square, which gives a greater cutting or pulverising power.

THE PULVERISING LAND-ROLLERS

contained only one entry—that of Crosskill's well-known and efficient implement. It is now properly taken out from among the Norwegian harrows, whose mode of working is so different. But we do not see what grounds there are for making separate sections for the *Pulverising* and the *Consolidating Land-Rollers.* All rollers both pulverise and consolidate; and indeed we find Crosskill has the same form of implement entered among the

CONSOLIDATING LAND-ROLLERS.

This was a good section, having twelve entries, which were mostly distinguished by substantiality and cheapness. There were only two entries for

LAND-PRESSERS.

Crosskill had a very well got-up sowing-machine, on the cup principle, attached to his workmanlike-finished implement.

RIBBING MACHINES.

Kirkwood showed an excellent article. The points or shares were of considerable length, which will serve to give the mouldboards greater steadiness in working. The wheels, too, are firmly fixed to the body of the machine.

HARROWS.

There was a good display of harrows for *heavy land,* but for *light land* they were too heavy and closely set in the tines, which renders them unsuitable for working and preparing land for green crops.

SWINGTREES.

This section was well filled. Mr Gray showed a capital assortment of well-made articles at moderate rates. Both for *common* and *equalising trees* the competition was close among the exhibitors.

SEED-SOWING MACHINES

exhibited general excellence in the *Broadcast* section. Moyes, near Kirkcaldy, exhibited quite a curiosity in the way of broadcast sowing-machines. It consisted of a box strapped over the shoulder, into which the grain is put. By driving a handle the grain is sent out in a shower, as in sowing by the hand. The grain was scattered over a breadth of thirty feet with great evenness. This machine was one of the novelties of the Perth Meeting. In the *Drill-sowing machine,* too, some of our Scotch makers have made considerable improvements on the usual form. Mr Sherriff has attached to his machines a good modification of the English foresteerage, which allows it to turn on a small space. He has also made his levers or coulters movable, and in drilling the outside wheel can be driven back in the same track. It is also said by its maker to sow beans quite as well as grain, by changing the pinions. The Scotch machine with its pinions is no doubt better adapted for sowing hilly land, as it requires a great deal of adjusting to sow the same quantity of seed up and down hill with the cup-barrels. Garrett of Saxmundham showed one of his celebrated drills: considerable improvements have been made on it within a few years. On level land these machines do their work with great accuracy, and the braird comes up as if the rows had been lined off with a square. Garrett's machine might be made somewhat lighter without impairing its strength: other English makers are now keeping this in view, and are turning out a more tidy, and, to all appearance, as useful an implement. Of sowing-machines for *Grass Seeds* there were only four entries; and perhaps for horse-power the section should embrace machines for sowing both corn and grass seeds. By a little additional workmanship the two operations can be as well done by one machine as by two. Mr Patterson of Offers suggests that, for grass-seed sowing-machines, a separate section should be made for machines to be worked by a man, as there are a great many small farms where such an implement is much needed. Sowing-machines for *Turnips* were not so good a collection. In many of them some of the most important parts were slightly got up, and did not seem improvements on those at former shows.

MACHINES FOR PULVERISING GUANO.

There were seven entries in this section, and most of them were well finished. The lighter forms prevailed. Mr Halkerston's (Freuchie) machine had a heavy lever pressing against the plate upon which the teethed drum works. This will no doubt ease all parts of the machine when any pieces of stone find their way into the hopper along with the lumps of guano.

MACHINES FOR DISTRIBUTING GUANO

exhibit marked improvement. Though not in competition, Gar-

rett showed his largely-used machine, which was eagerly scanned by the visitors. It is only a pity that the various machines on the ground were not subjected to a thorough trial. A cheap guano-distributor would have an immense sale among agriculturists, who are in the expectation that this desideratum will make its appearance before long.

HORSE-HOES.

There were five entries for horse-hoes for grain crops, which did not show any marked improvement over those at former exhibitions of the Society. Garrett exhibited his machine with its latest additions in the way of improvements. For soils of some strength and consistence no better machine has yet been brought out. Mr Garrett might take the hint that, as his machine is seldom or never used for turnips in Scotland, a somewhat lighter and cheaper implement would suit us better. There were fourteen entries of *Horse-hoes for green crops.* They were a capital lot, and the Judges must have had no little difficulty in making the awards.

MACHINES FOR SINGLING TURNIPS.

There was only one entry in this section,—the well-made and finished machine of Messrs M'Gregor and Lewis. Invention can scarcely go further in this operation. Indeed, this or any other horse-machine does not profess to *single* turnips, but only to give them a rough thinning. The same end can be attained by sowing on the dibbling or drop principle, which at the same time effects a great saving of seed.

FANNERS.

There were nine entries of *Fanners for winnowing and cleaning grain.* Mr Melvin, Bonnington, one of the Judges in this department, remarks on the section: "There was nothing new which surpassed the old forms. Those of Mr Baker, Wisbech, were painted as if for a drawing-room, yet seemingly strong and well made. They were much too wide for one person driving them easily, and obtaining sufficient wind to separate the light corn. The cleaned grain also being brought out on the floor, this form is not so useful in barns. Todd and Pringle exhibited a machine in which an attempt was made to cause the grain to pass over a long space of screen; but it was so hard to drive, that until they are lightened in this respect they cannot be accounted as fit for hand use. Messrs Smith's (of Glasgow) machine, after greater experience in barn-work, may become useful. Mr Spence's (Burntisland) machine made tolerable work, and promises well. Richardson of Carlisle was the successful competitor."

These remarks of Mr Melvin so far support the view we took of the Fanners at this Show; we think it is altogether a mistake to give so much encouragement to such heavy-to-drive and expen-

sive machines as were exhibited. The fundamental error is in supposing that the cleaning of grain is best accomplished by a complicated set of riddles. Thorough fanning and riddling are two operations which cannot be both well done by one machine. The riddles destroy the strength of the wind, which should be made to strike the grain freely just when it falls from the hopper-roller, and before it attains any velocity in its descent. Todd's screen is a very feasible-looking invention, but we would not like to have it at all times attached to winnowing-machines. Mr Pringle exhibited at his stand one of Boby's patent corn-screens, which for certain purposes is most valuable.

WEIGHING-MACHINES.

Mr Melvin says, "In this section there was little to remark. Those for carts were a good lot. Smiths' (of Glasgow) showed several improvements, more especially in the one made of cast-iron for the lever and weight. This affords thorough protection to index weight, and renders it less easily put out of order."

It struck us that for farm purposes it would be much better to have neat steelyards for weighing grain than the forms exhibited, which are anything but suitable for weighing both grain and other substances.

STRAW-CUTTERS.

Mr Melvin writes, "For hand-power Messrs Richmond & Chandler stood second to Picksley, Sims, & Co., whose machine, costing L.5, 12s. 6d., made excellent work, being easily driven and adjusted. For power the machines have reached a high style of perfection in their construction, one machine-maker rivalling another in minute and accurate adjustments of certain parts, thus contriving to take a step in advance of a successful opponent of former years."

TURNIP-CUTTERS.

Bentall has revived Phillips's horizontal turnip-cutter, which can be made suitable for sheep or cattle. Phillips's pleased very well so long as it kept in order, but, being slimly made, did not last long. Bentall has made quite a new and substantial implement of it, and by having the driving gearing on the top instead of the bottom of the upright shaft, it is not liable to clog and get out of order.

PULPERS.

Mr Melvin says, "The quality of the pulp produced by Picksley, Sims, and Co. was far superior to Bentall's, evidently showing that the latter had been resting secure, and trusting to the name his machines have hitherto had, while others have been advancing. Both machines were well constructed, and while different opinions may exist as to the lasting of each in actual work, still it is by the quality of the work which a machine makes that its value must be at first ascertained. No trial possible at a show-yard is sufficient

to test the powers of endurance; the machine making the best work must therefore generally win. A protest was lodged by Bentall against the decision of the Judge in this section."

GRAIN AND CAKE BRUISERS.

In *Linseed and Oilcake Bruisers* the competition was close, "a few minute alterations on machines of former years," Mr Melvin remarks, "reversing former awards."

STEAMING APPARATUS FOR FOOD.

This section still shows marked progress in workmanship and cheapening of these useful additions to the modern farmstead.

CHURNS.

This section was well filled with highly-finished articles. Mr Melvin remarks, "Tinkler's were not only of excellent workmanship, but the principle of their construction places them ahead of all others exhibited. We missed any specimens of the churns which are usually employed when the whole milk is churned, most of those exhibited being principally for cream."

CHEESE-PRESSES,

says Mr Melvin, "were a meagre display as compared with those exhibited at Dumfries."

ONE-HORSE CARTS.

There were eleven entries, and, as again writes Mr Melvin, "mostly all approached closely in their respective merits, yet of them united all the requirements which a complete one-horse cart should possess. Some had imperfect locks, in others the body was much too small, while the frames of a few were not well proportioned and supported. In others the shafts were weakened with bolts running through them, without having the wood strengthened with iron at the points where most exposed to strains. The wheels were generally very good. Crosskill's *Harvest Carts* were made of capital material, well put together, and the wheels excellent, but the principle of the carrying part was quite erroneous. In all carts intended for supporting and carrying a high body of bulky material, perfect solidity and rigidity of the frame are essentially necessary. To secure safety, every arrangement of the framing which may produce a spring or give elasticity to the load ought to be avoided. In both Crosskill's carts the amount of leverage which several parts of the framing give is very great. This renders it unsafe to cross furrows on uneven or hilly ground, while on the road it must tell on the draught. One well-made low-set cart was so covered with sharp iron bolt-heads, that should the man in charge have fallen, it was impossible he could save himself from being thrown on them."

STACK PILLARS.

Good assortment in this section. Some of the caps might be small enough, and, with cheap material, this part should be made in general far more ample than it usually is. The turn-stack pillar was the novelty in this section. It seemed light enough for effecting what is, in some cases, a desirable object.

FIELD-GATES.

There was an excellent display in the section of strong, well-made, and cheap articles. Young & Co.'s (of Edinburgh) were deservedly much admired, as well as their iron hurdles.

PIPE AND TILE MACHINES.

There were only two competitors in this section, and Finlayson and Page both exhibited very excellent machines. The one was for hand and the other for power; but the terms of the premium, being for "hand or power," left the Judges in not a little perplexity which should have the preference. In future there should either be two sections—one for hand and one for power, or only one for *hand and power.*

TILES AND PIPES FOR DRAINAGE AND SEWERAGE.

These were exhibited in great variety, and many were struck with the new modes of socketing and joining. Christie & Son's tiles and pipes for field-drainage were beautiful specimens, showing a high degree of perfection arrived at in this art.

GAS APPARATUS

for country and farmhouses has also made considerable advances, so far as cheapening is concerned. Messrs Porter, Lincoln, show a very well-got-up gas-making apparatus under L.50, which now places this luxury within the reach of many.

EXTRA IMPLEMENTS AND MACHINES.

Among these implements the first on the list is the horse-rake, which reminds us that there was a very poor show of these at Perth compared with Dumfries. Was the want of prizes in this instance the cause of reducing their numbers? Those who were on the outlook for the best rake had a good deal to do to find them, as they lay scattered over the western part of the yard. Watson's rake, which is fitted up for the driver to be seated above the frame, was the only new form. It might be so far an improvement on level land, but would not suit well for hilly farms.

REAPERS.

Invention is still busy in lightening, simplifying, and strengthening the more important parts of these recent auxiliaries to the harvesting of the crops. For no other machines is the public so much on the tiptoe of expectation that further improvements

will be effected before long. Many are yet afraid to invest lest they should miss the "latest improvements." If we cannot chronicle anything particularly new in their construction, the general excellence in the workmanship is much improved. Gardner & Lindsay showed their somewhat highly-finished reaper, which, however, is not so well adapted in some of its parts to wear well. Kemp & Co. showed a strong and substantial article, to all appearance with considerable endurance in its structure. There was neither polish upon it, nor roughness in the execution of its details. Jack, of Maybole, also exhibited a lighter but apparently well-got-up machine. Cuthbert's, by Mr Meas, seemed to be a combination of strength and lightness that none of the others seemed to approach. Wood's reaper, by Cranston, attempts, for a hand-sheafing machine, to do a great deal too much. The sheaf is partly turned round, and put out of the way for the horse returning, without the corn being lifted. This may be done pretty well in the case of short and light crops, but not where they are long and thick. Mackay, from Freuchie, Fife, showed an ingenious self-acting tilting-board. This may ultimately do well enough, but a higher class of workmanship is required. Gillespie, of Kingsbarns, showed a light web delivering-machine that is worthy of being wrought out. Last of all, Watson, of Errol, showed Bell's celebrated reaper with latest improvements. The weight of the machine is now reduced to 14 cwt.

There being no prizes for steam-engines and thrashing-machines this year, they created less interest. The merits of the rubbing drum are now better known as to the localities where it is most applicable. While the demand for the English drum has somewhat slackened in Scotland, it carries all before it in the south. Among the general articles exhibited, was Gorrie's (of Perth) corn-meter, which might form a useful article either in the stable of the proprietor or the tenant. His ratchet roller, for straining wine, showed that this is an old invention; and his potatoe riddle seems to be worth the additional money he puts upon it. Lincoln's suckling machine for calves or lambs seemed to answer the end well for kids and pigs, and afforded some amusement to the visitors. M'Cormick's right and left hand plough, odd and clumsy to appearance, is perhaps as light and as easily managed as the turn-wrest. Martin's turnip-lifter, which cuts the roots of swedes, and leaves them quite loose and easy to lift, may make its way. The price is moderate (L.2, 5s.), but might still be lessened. The North British Rubber Company, Castlemills, Edinburgh, gave specimens of the many uses to which they apply this material for belting, pipes, and other purposes. The collection was a most interesting one. *In Sheep-Dipping Apparatus*, Rawdin, Carruthers, & Bigg exhibited theirs, and detailed the qualities of their dip. Smith Brothers & Co. had a great variety of machines. Bradford's washing, wringing, and mangling machines elicited general approbation. Howard

had good specimens of the articles he sends out in such numbers—ploughs, harrows, and horse-rakes. His steam-cultivating apparatus was exhibited at work in a field near the show-ground. The land, however, was not in so fit a state as was desirable for showing the powers of the implement most favourably. Middleton, Morton, had a great variety of wirework for fencing and other purposes. Among Pringle's collection, M'Nab's tree-transplanting machine attracted great attention, as the specimen it had under its ropes and pulleys showed its capabilities. Richmond & Chandler; Robson, Glasgow; Williamson Brothers; Picksley, Sons, & Co., Kendal; Young, Edinburgh, had such a display in their several stands as added greatly to the interest of the exhibition, and amply maintained their reputation as implement-makers. When the implements are in stands, anything but the most cursory notice of them can be given. The fullest descriptive catalogue could afford little assistance. The Society consider that they place all the exhibitors on the same level in not giving any descriptive notices of implements, and that the name, object, and price of the implements, with the maker and inventor's names, are all that should be given. Indeed it is not the function of the Society to recommend any machine by admitting commendatory statements, which, as is well known, would be apt to be often unduly indulged in. Exhibitors, in fact, would be very ready to compete with each other in trying who could write the most laudatory descriptions.

The word "improved" is kept out of the catalogue, as an improvement is only to be ascertained after it is fairly tested. The Judges award premiums and commendations, and the Society afterwards does its part in giving these publicity. If an opposite system would be more popular with exhibitors, the interests of the public are considered to be best consulted by the mere simple catalogue, for the reasons already stated.

If the Society does right in excluding condimental foods and artificial manures, the exhibition of plants, seeds, and roots by our nurserymen and seedsmen would help greatly to garnish the show-yard, in forming a pleasing link between the live animals and the dead masses of the machines.

We have to thank all with whom we came in contact for the obliging manner in which they so readily gave information. In future the reports of the Judges should be drawn upon as largely as possible. One individual cannot be expected to go over the whole Show so minutely as those who have had special sections to examine. Viewing as we do the difficulty of giving a cursory report of the Show in the time we can allot to it, we the more readily can appreciate the inconvenience which the members of the press experienced in being excluded from the implement department on Monday and Tuesday while the Judges were awarding the premiums. With all deference, we think the present rule ought to be rescinded.

AWARD OF PREMIUMS.

CLASS I.—CATTLE.

SHORT-HORN.

Judges—WILLIAM CARR, Stackhouse, Settle, Yorkshire; JOHN COLLIER, Panlathy, Carnoustie; THOMAS HUNT, Thornington, Coldstream. *Attending Member*—ROBERT HECTOR, Montrose.

SECTION

1. Best Bull calved before 1st January 1859—L.20 to A. Cruickshank, Sittyton, Aberdeen. Second—L.10 to Silvester Campbell, Kinnellar, Blackburn, Aberdeen. Third—The bronze medal to G. H. Binning Home, of Argaty, Doune. The silver medal to Mark S. Stewart, of Southwick, Dumfries, as the *Breeder* of the Best Bull. Highly commended—Alexander Reid, Cruivie, Cupar. Commended—The Earl of Airlie, Cortachy Castle, Kirriemuir.
2. Best Bull calved after 1st January 1859—L.20 to James Anderson, Corntown, Bridge of Allan. Second—L.10 to the Duke of Montrose, Buchanan, Drymen. Third—The bronze medal to William Marr, Upper Mill, Tarves. Highly commended—James Hozier, Mauldslie Castle, Carluke. Commended—Thomas Stobie, Balneathill, Kinross.
3. Best Bull calved after 1st January 1860—L.10 to Arthur James Balfour, of Whittingham, Prestonkirk. Second—L.5 to William Stirling, of Keir, M.P., Dunblane. Third—The bronze medal to W. S. Turnbull, Huntingtower, Perth. Highly commended—G. H. Binning Home of Argaty, Doune. Commended—Robert Arkley of Ethiebeaton, Dundee.
4. Best Cow of any age—L.15 to Richard Booth, Warlaby, Northallerton. Second—L.8 to Richard Booth, Warlaby, Northallerton. Third—The bronze medal to David Ainslie of Costerton, Blackshiels. Highly commended—Viscount Strathallan, Strathallan Castle, Auchterarder. Commended—John Gardiner, Kinkell, Auchterarder.
5. Best Heifer calved after 1st January 1859—L.10 to Richard Booth, Warlaby, Northallerton. Second—L.5 to A. and A. Mitchell, Alloa. Third—The bronze medal to James Douglas, Athelstaneford, Drem. Highly commended—George Shepherd, Shethin, Tarves. Commended—A. J. Balfour of Whittingham, Prestonkirk.
6. Best Heifer calved after 1st January 1860—L.8 to James Douglas, Athelstaneford, Drem. Second—L.4 to James Douglas, Athelstaneford, Drem. Third—The bronze medal to James Douglas, Athelstaneford, Drem. Highly commended—The Earl of Airlie, Cortachy Castle, Kirriemuir. Commended—Viscount Strathallan, Strathallan Castle, Auchterarder.

EXTRA SHORT-HORN.

The medium gold medal was awarded to James Douglas, Athelstaneford, Drem, for a Cow, *winner of the first premium at Perth in* 1852; and to James Douglas, Athelstaneford, Drem, for a Cow, *winner of the first premium at Dumfries in* 1860.

POLLED.

Judges—ARTHUR GLENNIE, Ferneiflat, Bervie; WALTER M'CULLOCH of Ardwall, Gatehouse; HUGH WATSON, Perth. *Attending Member*—Admiral BETHUNE of Balfour, C.B., Markinch.

7. Best Bull calved before 1st January 1859—L.20 to Thomas Lyell, Shielhill, Kirriemuir. Second—L.10 to Alexander Paterson, Mulben, Keith. Third—The bronze medal to James Graham, Meikle Culloch, Dalbeattie. The silver medal to Thomas Lyell, Shielhill, Kirriemuir, as

the *Breeder* of the best Bull. Highly commended—Robert Walker, Portlethen, Aberdeen. Commended—The Trustees of the late R. Scott, Balwyllo, Brechin.

8. Best Bull calved after 1st January 1859—L.20 to Thomas Lyell, Shielhill, Kirriemuir. Second—L.10 to James Leslie, Thorn, Blairgowrie. Third—The bronze medal to the Trustees of the late Robert Scott, Balwyllo, Brechin. Highly commended—Robert Walker, Portlethen, Aberdeen. Commended—Thomas Ferguson, Kinnochtry, Coupar-Angus.
9. Best Bull calved after 1st January 1860—L.10 to Robert Walker, Montbletton, Banff. Second—L.5 to the Trustees of the late Robert Scott, Balwyllo, Brechin. Third—The bronze medal to John Collie, Ardgay, Forres. Highly commended—The Earl of Southesk, Kinnaird Castle, Brechin. Commended—James Leslie, Thorn, Blairgowrie.
10. Best Cow of any age—L.15 to John Collie, Ardgay, Forres. Second—L.8 to Robert Walker, Montbletton, Banff. Third—The bronze medal to the Earl of Southesk, Kinnaird Castle, Brechin. Highly commended—Robert Walker, Montbletton, Banff. Commended—The Earl of Southesk, Kinnaird Castle, Brechin.
11. Best Heifer calved after 1st January 1859—L.10 to the Trustees of the late Robert Scott, Balwyllo, Brechin. Second—L.5 to the Trustees of the late Robert Scott, Balwyllo, Brechin. Third—The bronze medal to the Trustees of the late Robert Scott, Balwyllo, Brechin. Highly commended—The Earl of Southesk, Kinnaird Castle, Brechin. Commended—James Hay Erskine Wemyss, M.P., Wemyss Castle, Kirkcaldy.
12. Best Angus Heifer, calved after 1st January 1860—L.8 to the Earl of Southesk, Kinnaird Castle, Brechin. Second—L.4 to James Leslie, Thorn, Blairgowrie. Third—The bronze medal to John Collie, Ardgay, Forres. Highly commended—James Leslie, Thorn, Blairgowrie. Commended—The Earl of Southesk, Kinnaird Castle, Brechin.
12. Best Galloway Heifer calved after 1st January 1860—L.8 to James Graham, Meikle Culloch, Dalbeattie. Second—L.4 to Thomas Biggar, King's Grange, Haugh of Urr. Third—The bronze medal to James Graham, Meikle Culloch, Dalbeattie. Highly commended—James Graham, Meikle Culloch, Dalbeattie.

EXTRA POLLED.

The medium gold medal was awarded to John Collie, Ardgay, Forres, for a Polled Cow, *winner of the first premium at Edinburgh in* 1859; and to James Graham, Meikle Culloch, Dalbeattie, for a Polled Galloway Cow, *winner of the first premium at Dumfries in* 1860. Highly commended—a Polled Aberdeen and Angus Heifer, belonging to Robert Walker, Portlethen, Aberdeen.

AYRSHIRE.

Judges—Ivie Campbell, Dalgig, New Cumnock; Robert Guthrie, Crossburn, Troon; John Macadam, Blairover, Drymen. *Attending Member*—James Macalpine Leny of Dalswinton, Dumfries.

13. Best Bull calved before 1st January 1859—L.20 to Robert M'Kean, Lumloch, Bishopbriggs. Second—L.10 to the Duke of Athole, K.T., Dunkeld. Third—The bronze medal—*No competition*. The silver medal to James Frew, Balmalloch, Kilsyth, as the *Breeder* of the best Bull.
14. Best Bull calved after 1st January 1859—L.10 to John Stewart, Burnside Cottage, Strathaven. Second—L.5 to David M'Gibbon, Redhouse, Bathgate, Linlithgowshire. Third—The bronze medal to John Marshall, Airbles, Motherwell. Highly commended—James Williamson, Stonefield, Blantyre. Commended—John Stewart, Burnside Cottage, Strathaven.

15. Best Cow in Milk of any age—L.10 to the Earl of Strathmore, Glammis Castle, Forfarshire. Second—L.5 to James Frew, Balmalloch, Kilsyth. Third—The bronze medal to John Marshall, Airbles, Motherwell. Highly commended—The Earl of Strathmore, Glammis Castle. Commended—The Duke of Athole, K.T., Dunkeld.
16. Best Cow in Calf of any age—L.10 to John Wilson, Crosshouse, Roslin. Second—L.5 to Gabriel Dunlop, Corsehill, Stewarton. Third—The bronze medal to John Stewart, Burnside Cottage, Strathaven. Highly commended—Gabriel Dunlop, Corsehill, Stewarton. Commended—Gabriel Dunlop, Corsehill, Stewarton.
17. Best Heifer calved after 1st January 1859—L.8 to the Earl of Strathmore, Glammis Castle, Forfarshire. Second—L.4 to James Frew, Balmalloch, Kilsyth. Third—The bronze medal to John Stewart, Burnside Cottage, Strathaven. Highly commended—James Williamson, Stonefield, Blantyre. Commended—Gabriel Dunlop, Corsehill, Stewarton.
18. Best Heifer calved after 1st January 1860—L.6 to John Stewart, Burnside Cottage, Strathaven. Second—L.3 to John Stewart, Burnside Cottage, Strathaven. Third—The bronze medal to Gabriel Dunlop, Corsehill, Stewarton.

EXTRA AYRSHIRE.

The medium gold medal was awarded to each of the following:—The Duke of Athole, K.T., Dunkeld, for a Cow, *winner of the first premium at Glasgow in* 1857; and to the Duke of Athole, K.T., Dunkeld, for a Cow, *winner of the first premium at Edinburgh in* 1859.

HIGHLAND.

Judges—J. S. MENZIES of Chesthill, Aberfeldy; DONALD SINCLAIR, Auchinveir, Oban; DONALD STEWART, Cornish, Tyndrum. *Attending Member*—ROBERT P. NEWTON, Kerse, Falkirk.

19. Best Bull calved before 1st January 1858—L.20 to the Marquess of Breadalbane, K.T., Taymouth Castle, Aberfeldy. Second—L.10 to Neil Mackellar, Kilmartin, Lochgilphead. Third—The bronze medal to Allan Pollok of Ronachan, Tarbert. The silver medal to the Marquess of Breadalbane, as the *Breeder* of the best Bull. Highly commended—John Robertson, Glenlyon House, Fortingal. Commended—The Right Hon. Duncan M'Neill of Colonsay, Lord Justice-General.
20. Best Bull calved after 1st January 1858—L.10 to Richard D. Campbell of Jura, Jura. Second—L.5 to John MacLaren, Monzie, Blair-Athole. Third—The bronze medal to the Duke of Hamilton and Brandon, Arran.
21. Best Bull calved after 1st January 1859—L.8 to the Marquess of Breadalbane, Taymouth Castle, Aberfeldy. Second—L.4 to Richard D. Campbell of Jura, Jura. Third—The bronze medal to Allan Pollok of Ronachan, Tarbert.
22. Best Cow of any age—L.10 to Donald M'Laren, Corrychrone, Callander. Second—L.5 to Allan Pollok of Ronachan, Tarbert. Third—The bronze medal to the Marquess of Breadalbane, Taymouth Castle, Aberfeldy. Highly commended—The Marquess of Breadalbane. Commended—The Marquess of Breadalbane.
23. Best Heifer calved after 1st January 1858—L.8 to Allan Pollok of Ronachan, Tarbert. Second—L.4 to Richard D. Campbell of Jura, Jura. Third—The bronze medal to the Marquess of Breadalbane, Taymouth Castle, Aberfeldy. Highly commended—The Marquess of Breadalbane. Commended—Allan Pollok of Ronachan, Tarbert.

24. Best Heifer calved after 1st January 1859—L.6 to the Marquess of Breadalbane, Taymouth Castle, Aberfeldy. Second—L.3 to Donald M'Laren, Corrychrone, Callander. Third—The bronze medal to the Marquess of Breadalbane, Taymouth Castle, Aberfeldy. Highly commended—Richard D. Campbell of Jura. Commended—Allan Pollok of Ronachan, Tarbert.

EXTRA HIGHLAND.

The medium gold medal was awarded to the Duke of Hamilton and Brandon, Brodick Castle, Arran, for a Cow, *winner of first premium at Dumfries in* 1860. Commended—Cow belonging to Neil M'Kellar, Kilmartin, Lochgilphead.

FAT STOCK.

Judges—JOHN COLLIER, Pantlathy, Carnoustie; HUGH WATSON, Perth; WILLIAM RUXTON, Farnell, Brechin. *Attending Member*—ROBERT HECTOR, Montrose.

25. Best Ox of any Pure or Cross Breed calved after 1st January 1858—The medium gold medal to A. and A. Mitchell, Alloa. Second—The silver medal.—*No Entry.*
26. Best Ox of any Pure or Cross Breed calved after 1st January 1859—The medium gold medal to George Syme, Couston, Aberdour. Second—The silver medal to George Syme, Couston, Aberdour. Third—The Bronze Medal to A. W. Russell of Kenly Green, St Andrews. Highly commended—George Brown, Balgarvie, Cupar-Fife. Commended—Wm. Peterkin, Woodside, Cullen.
27. Best Ox of any Pure or Cross Breed calved after 1st January 1860—The medium gold medal. *No Competition.* Second—The silver medal —*No Entry.*
28. Best Highland Ox calved after 1st January 1857—The medium gold medal to the Marquess of Breadalbane, Taymouth Castle, Aberfeldy. Second—The silver medal to the Marquess of Breadalbane. Third—The bronze medal to the Marquess of Breadalbane.
29. Best Highland Ox calved after 1st January 1858—The medium gold medal to John Dickson, Saughton Mains, Edinburgh. Second—The silver medal to the Marquess of Breadalbane. Third—The bronze medal to the Marquess of Breadalbane.
30. Best Cross Heifer calved after 1st January 1859—The medium gold medal to George Brown, Balgarvie, Cupar-Fife. Second—The silver medal to Henry A. Rannie, Mill of Boyndie, Banff.
31. Best Cross Heifer calved after 1st January 1860—The medium gold medal to James Robertson, Denbrae, Cupar-Fife. Second—The silver medal to Henry A. Rannie, Mill of Boyndie, Banff. Third—The bronze medal—*No Entry.*

EXTRA CATTLE.

Highly Commended—Cross Ox, belonging to A. W. Russell of Kenly Green, St Andrews. Athole Cow, belonging to Sir John P. Orde, Bart., of Kilmory, Lochgilphead. Three Brittany Cows, belonging to John Prentice, Tollcross, Edinburgh. Commended—Cross Ox, belonging to A. W. Russell, of Kenly Green, St Andrews. Athole Cow, belonging to Sir John P. Orde, Bart., of Kilmory, Lochgilphead. Alderney Bull Calf, belonging to David Lumsden, Pitcairnfield, Perth. Alderney Bull, belonging to J. Anstruther Thomson of Charleton, Colinsburgh. Brittany Bull, belonging to John Prentice, Tollcross, Edinburgh. Two Brittany Cows, belonging to John Prentice, Tollcross, Edinburgh.

Class II.—HORSES
FOR AGRICULTURAL PURPOSES.

Judges—Stallions; Robert Clark, Thankerton House, Biggar; Andrew Renwick, Gairbraid, Maryhill, Glasgow; James Wilkin, Tinwald-downs, Dumfries. *Attending Member*—Sir Thomas Gladstone of Fasque, Bart., Laurencekirk.

Judges—Mares: Peter Drew, Carmyle, Tollcross, Glasgow; Dugald Napier, Glasgow; John Young, Wester Fullwood, Paisley. *Attending Member*—David Henderson of Gattaway, Newburgh.

Section

1. Best Stallion foaled before 1st January 1858—L.30 to William Kerr, Lochend, Kilbirnie. Second—L.15 to John Barr, Barangry, Bishopton, Glasgow. Third—The bronze medal to Robert Sorley, Thornhill, Kincardine. The silver medal to Mr Fleming, Auchinbothie, Kilmalcolm, as the *Breeder* of the best Stallion. Highly commended—Andrew Logan, Crossflatt, Kilbarchan. Commended—Alex. Gardner, Linclive, Paisley.
2. Best Entire Colt foaled after 1st January 1858—L.20 to John Barr, Barangry, Bishopton. Second—L.10 to Peter Crawford, Dumgoyack, Strathblane. Third—The bronze medal to Daniel Crawford, Barnbeath, Kilbarchan. Highly commended—Alex. Sim, Fawells, Keith-Hall. Commended—William Muir, Hardington Mains, Wiston.
3. Best Entire Colt foaled after 1st January 1859—L.15 to David Logan, Netherton, Renfrew. Second—L.8 to James M. Russell, Coalston Mains, Haddington. Third—The bronze medal to Matthew Kerr, Gree, Beith.
4. Best Entire Colt foaled after 1st January 1860—L.10 to Samuel Clark, Manswrae, Kilbarchan. Second—L.5 to James Scott, Kirkton, Renfrew. Third—The bronze medal to William Kerr, Wester Causeway-end, Midcalder.
5. Best Mare (with foal at foot) foaled before 1st January 1858—L.20 to Alexander Naismith, Windlestrawlee, Edinburgh. Second—L.10 to Robert Murdoch, Hallside, Cambuslang. Third—The bronze medal to John Watson, 21 Bath Street, Glasgow. Highly commended—Wm. Stirling of Keir, M.P., Dunblane. Commended—John Kerr, Morton, Midcalder.
6. Best Mare (in foal), foaled before 1st January 1858—L.15 to William Park, Balquhanran, Dalmuir, East Kilpatrick. Second—L.8 to David Roberton, Ryewraes, Kilbarchan (*forfeited*). Third—The bronze medal to David Logan, Netherton, Renfrew. Highly commended—James Gray, Blawarthill, Partick. Commended—James M'Artney, Muckhart, Perth.
7. Best Filly foaled after 1st January 1858—L.10 to William Park, Balquhanran, Dalmuir, East Kilpatrick. Second—L.5 to David Riddell, Kilbowie, Duntocher. Third—The bronze medal to John Kerr, Morton, Midcalder. Highly commended—Sir Thomas Moncrieffe of Moncrieffe, Bart., Perth. Commended—George Stenhouse, West Pilton, Blackhall.
8. Best Filly, foaled after 1st January 1859—L.8 to A. B. Yuille of Darleith, Cardross. Second—L.4 to Robert Findlay, Easterhill, Glasgow. Third—The bronze medal to John Barr, Barangry, Bishopton, Glasgow. Highly commended—Robert Findlay, Easterhill, Glasgow. Commended—John Kerr, Morton, Midcalder.
9. Best Filly foaled after 1st January 1860—L.6 to James M'Artney, Muckhart (*under protest*). Second—L.3 to Matthew Scott, Denniston, Kilmalcolm. Third—The bronze medal to James Eason, Inches, Falkirk. Highly commended—William Stirling of Keir, M.P., Dunblane. Commended—James Swan, Rigside, Douglas.

PONIES.

10. Best Pony Stallion not over 14 nor under 12 hands—L.8.—*No Entry.*
11. Best Pony Mare of the same height—L.4 to James Leslie, Thorn, Blairgowrie. Second—L.2 to Archibald Horne of Inverchroskie, Blairgowrie. Third—The bronze medal to John Chapman, Drumcairn, Abernethy. Highly commended—David Harris, Wilton, Drimmie, Blairgowrie. Commended—Adam Wilson, Auchingownie, Forgandenny.

EXTRA HORSES.

The medium gold medal was awarded to William Wilson, Durie Street, Leven, for a Stallion, age eight years, *winner of the first premium at Aberdeen in* 1858. Highly commended — Thoroughbred Filly, belonging to John Rutherford, Muirhall, Perth. Half-bred Carriage Horse, belonging to William Thomson of Balgowan, Perth. Cob, belonging to D. L. Jolly, Grange, Perth. Highland Pony, belonging to the Duke of Athole, K. T. Commended—Thoroughbred Mare, belonging to John C. Fernie, Kellie, Pittenweem.

CLASS III.—SHEEP.

BLACKFACED.

Judges—ROBERT PATERSON of Birthwood, Biggar; DONALD STEWART, Cornnish, Tyndrum; JOHN LORN STEWART of Coll, Campbeltown. *Attending Member*—FLETCHER N. MENZIES, Tirinie, Aberfeldy.

Section

1. Best Tup, not more than four shear—L.10 to Alexander Campbell of Auchindarroch, Lochgilphead. Second—L.5 to Alexander Campbell of Auchindarroch, Lochgilphead. Third—The bronze medal to the heirs of the late James Watson, Mitchellhill, Biggar. Highly commended—Robert Elliot, Laighwood, Dunkeld. Commended—William Guild, Glenquay, Dollar.
2. Best Dinmont or Shearling Tup—L.10 to John M'Laren, Monzie, Blair-Athole. Second—L.5 to Thomas Murray, Eastside, Penicuik. Third—The bronze medal to James Craig of Craigdarroch, New Cumnock. Highly commended—John Malcolm of Poltalloch, Lochgilphead. Commended—Walter Murray, Walston, Penicuik.
3. Best Pen of Five Ewes, not more than four shear—L.8 to John M'Laren, Monzie, Blair-Athole. Second—L.4 to John M'Laren, Monzie, Blair-Athole. Third—The bronze medal to Thomas Murray, Eastside, Penicuik. Highly commended—Allan Pollok of Ronachan, Tarbert. Commended—John and Joseph M'Laren, Muirpersie, Kirriemuir.
4. Best Pen of Five Shearling Ewes or Gimmers—L.8 to Allan Pollok of Ronachan, Tarbert. Second—L.4 to James Drife, Barr, Sanquhar. Third—The bronze medal to John and Joseph M'Laren, Muirpersie, Kirriemuir. Highly commended—William Turner, Gavinburn, Old Kilpatrick. Commended—John Wilson, Crosshouse, Roslin.

CHEVIOT.

Judges—WILLIAM AITCHISON of Linhope, Hawick; WILLIAM GUNN, Glendhu, Golspie. *Attending Member*—JOHN MORTON, Muirton, Perth.

5. Best Tup not more than four shear—L.10 to James Brydon, Moodlaw, Langholm. Second—L.5 to Thomas C. Borthwick, Hopsrig, Langholm. Third—The bronze medal to Thomas Brydon, Kinnelhead, Moffat. Highly commended—James Brydon, Moodlaw, Langholm. Commended—Thomas C. Borthwick, Hopsrig, Langholm.
6. Best Dinmont or Shearling Tup—L.10 to Thomas Brydon, Kinnelhead, Moffat. Second—L.5 to Thomas C. Borthwick, Hopsrig, Langholm. Third—The bronze medal to James Brydon, Moodlaw, Langholm.

Highly commended—Thomas Brydon, Kinnelhead, Moffat. Commended—Thomas C. Borthwick, Hopsrig, Langholm.

7. Best Pen of Five Ewes not more than four shear—L.8 to James Brydon, Moodlaw, Langholm. Second—L.4 to Thomas C. Borthwick, Hopsrig, Langholm. Third—The bronze medal to John Carruthers, Kirkhill, Moffat. Highly commended—Thomas Welsh, Ericstane, Moffat. Commended—Robert Borland, Auchencairn, Closeburn.
8. Best Pen of Five Shearling Ewes or Gimmers—L.8 to James Brydon, Moodlaw, Langholm. Second—L.4 to Thomas C. Borthwick, Hopsrig, Langholm. Third—The bronze medal to William G. Hunter, Dumfedling, Eskdalemuir. Highly commended—Robert Borland, Auchencairn, Closeburn. Commended—John Archibald, Duddingston, South Queensferry.

LEICESTER.

Judges—Thomas Cockburn, Sisterpath, Dunse; James Elliot, Lamberton, Berwick; William Owen, Blessington, County Wicklow. *Attending Member*—James Melvin, Bonnington, Ratho.

9. Best Tup not more than four shear—L.10 to John White, Muirhead, Dunning. Second—L.5 to Thomas Simson, Blainslie, Lauder. Third—The bronze medal to Peter Reid, Waukmilton, Linlithgow. Highly commended—David Wallace, Balgrummo, Leven. Commended—James Beattie, Newbie House, Annan.
10. Best Dinmont or Shearling Tup—L.10 to James Beattie, Newbie House, Annan. Second—L.5 to George Simson, Courthill, Kelso. Third—The bronze medal to James Beattie, Newbie House, Annan. Highly commended—Thomas Simson, Blainslie, Lauder. Commended—George Simson, Courthill, Kelso.
11. Best Pen of Five Ewes not more than four shear—L.8 to Peter Reid, Waukmilton, Linlithgow. Second—L.4 to David Wallace, Balgrummo, Leven. Third—The bronze medal to Henry A. Rennie, Mill of Boyndie, Banff. Highly commended—Peter Reid, Waukmilton, Linlithgow. Commended—John Collie, Ardgay, Forres.
12. Best Pen of Five Shearling Ewes or Gimmers—L.8 to George Simson, Courthill, Kelso. Second—L.4 to Peter Reid, Waukmilton, Linlithgow. Third—The bronze medal to Thomas Simson, Blainslie, Lauder. Highly commended—David Wallace, Balgrummo, Leven. Commended—Lord Kinnaird, Rossie Priory, Inchture.

LONG-WOOLLED OTHER THAN LEICESTER.

Judges—The same as those for Leicester.

13. Best Tup not more than four shear—L.10 to the Earl of Wemyss and March, Gosford, Haddington. Second—L.5 to John Gibson, Woolmet, Dalkeith. Third—The bronze medal to Lord Kinnaird, Rossie Priory, Inchture. Highly commended—Lord Kinnaird. Commended—Dr George Johnston, Fincraigs, Newport, Fife.
14. Best Dinmont or Shearling Tup—L.10 to the Earl of Wemyss and March, Gosford, Haddington. Second—L.5 to John Gibson, Woolmet, Dalkeith. Third—The bronze medal to Lord Kinnaird, Rossie Priory, Inchture. Highly commended—Lord Kinnaird. Commended—John Gibson, Woolmet, Dalkeith.
15. Best Pen of Five Ewes not more than four shear—L.8 to John Gibson, Woolmet, Dalkeith. Second—L.4 to Lord Kinnaird, Rossie Priory, Inchture. Third—The bronze medal to R. Scot Skirving, Camptoun, Drem. Highly commended—The Earl of Wemyss and March. Commended—Dr George Johnston, Fincraigs, Newport, Fife.
16. Best Pen of Five Shearling Ewes or Gimmers—L.8 to Lord Kinnaird

Rossie Priory, Inchture. Second—L.4 to R. Scot Skirving, Camptoun, Drem. Third—The bronze medal to John Gibson, Woolmet, Dalkeith. Highly commended—the Earl of Wemyss and March.

SOUTHDOWN.

Judges—Walter M'Culloch of Ardwall Gatehouse; William Ruxton, Farnell, Brechin; Hugh Watson, Perth. *Attending Member*—George Ballingall, Cookston, Glammis.

17. Best Tup not more than four shear—L.10 to the Duke of Richmond, Gordon Castle, Fochabers. Second—L.5 to R. Scot Skirving, Camptoun, Drem. Third—The bronze medal to R. Scot Skirving, Camptoun, Drem. Highly commended—The Duke of Richmond. Commended—The Earl of Southesk.
18. Best Dinmont or Shearling Tup—L.10 to the Duke of Richmond, Richmond, Gordon Castle, Fochabers. Second—L.5 to R. Scot Skirving, Camptoun, Drem. Third—The bronze medal to James Aitchison, of Alderston, Haddington. Highly commended—R. Scot Skirving, Camptoun, Drem. Commended—R. Scot Skirving.
19. Best Pen of Five Ewes not more than four shear—L.8 to the Earl of Southesk, Kinnaird Castle, Brechin. Second—L.4 to R. Scot Skirving, Camptoun, Drem. Third—The bronze medal to R. Scot Skirving, Camptoun, Drem. Highly commended—The Earl of Southesk.
20. Best Pen of Five Shearling Ewes or Gimmers—L.8 to the Duke of Richmond, Gordon Castle, Fochabers. Second—L.4 to R. Scot Skirving, Camptoun, Drem. Third—The bronze medal to R. Scot Skirving, Camptoun, Drem.

EXTRA SHEEP.

Highly Commended:—Blackfaced Tup, belonging to Alexander M'Donald, Strathmashie, Laggan, Kingussie, *winner of first premium at Dumfries in* 1860.

Class IV.—SWINE.

Judges—James Steedman, Boghall, Roslin; Thomas Hunt, Thornington, Coldstream; James Elliot, Lamberton, Berwick. *Attending Member*—Alexander Scott, Craiglockhart, Edinburgh.

Section

1. Best Boar, large breed—L.8 to W. B. Wainman, Carhead, Crosshills, Yorkshire. Second—L.4 to John Laing, Glendeuglie, Kinross. Third—The bronze medal to John Laing, Glendeuglie, Kinross.
2. Best Boar, small breed—L.8 to W. B. Wainman, Carhead, Crosshills, Yorkshire. Second—L.4 to David Ainslie of Costerton, Blackshiels. Third—The bronze medal to Thomas D. Findlay, Easterhill, Glasgow.
3. Best Sow, large breed—L.6 to W. B. Wainman, Carhead, Crosshills, Yorkshire. Second—L.3 to Alex. Carswell, Barrhead. Third—The bronze medal—*No competition.*
4. Best Sow, small breed—L.6 to W. B. Wainman, Carhead, Crosshills, Yorkshire. Second—L.3 to Lord Kinnaird, Rossie Priory, Inchture. Third—The bronze medal to Thomas D. Findlay, Easterhill, Glasgow.
5. Best Three Pigs, not exceeding eight months old, large breed—L.4 to W. B. Wainman, Carhead, Crosshills, Yorkshire. Second—L.2—*No competition.* Third—The bronze medal—*No competition.*
6. Best Three Pigs, not exceeding eight months old, small breed—L.4 to George Mangles, Givendale, Ripon. Second—L.2 to John Mackay, Cross Arthurlie, Barrhead. Third—The bronze medal to the Earl of Wemyss and March, Gosford, Haddington. Another Pen of Three Pigs, belonging to the Earl of Wemyss and March, was disqualified for breeding, but recommended as superior extra stock.

Class V.—POULTRY.

Judges—John Curror, Comiston, Colinton; John Haig, Cameron House, Windygates, Fife; Charles Muirhead, jun., Edinburgh; *Attending Member*—Thomas Richardson, Dean of Guild, Perth.

Section

1. Best Coloured Dorking Cock and Two Hens—The silver medal to Mrs Fergusson Blair, Inchmartine House, Inchture. Second—The bronze medal to John Gibson, Woolmet, Dalkeith. Highly commended—Lord Kinnaird, Rossie Priory, Inchture. Commended—The Earl of Wemyss and March, Gosford, Haddington.
2. Best Coloured Dorking Cockerel and Two Pullets—The silver medal to John M'Callum, Hosh Distillery, Crieff. Second—The bronze medal to Lord Kinnaird, Rossie Priory, Inchture. Highly commended—The Earl of Wemyss and March. Commended—James Wilson, Wester Cowden, Dalkeith.
3. Best White Dorking Cork and Two Hens—The silver medal to the Earl of Mansfield, K.T., Scone Palace, Perth. Second—The bronze medal to Mrs Fergusson Blair, Inchmartine House, Inchture.
4. Best White Dorking Cockerel and Two Pullets—The silver medal to Thomas D. Findlay, Easterhill, Glasgow. Second—The bronze medal to the Earl of Mansfield, K.T., Scone Palace, Perth.
5. Best Coloured Cochin-China Cock and Two Hens—The silver medal to D. Stratton, Mid-Calder. Second—The bronze medal to Mrs Fergusson Blair, Inchmartine House, Inchture. Highly commended—Lord Loughborough, Dysart House, Kirkcaldy. Commended—John Paton, Balbedie, Kinross.
6. Best Coloured Cochin-China Cockerel and Two Pullets—The silver medal to D. Stratton, Mid-Calder. Second—The bronze medal to Mrs Fergusson Blair, Inchmartine House, Inchture.
7. Best White Cochin-China Cock and Two Hens—The silver medal to Mrs Fergusson Blair, Inchmartine House, Inchture. Second—The bronze medal to D. Stratton, Mid-Calder. Highly commended—Mrs Fergusson Blair.
8. Best White Cochin-China Cockerel and Two Pullets—The silver medal to D. Stratton, Mid-Calder. Second—The bronze medal to Mrs Fergusson Blair, Inchmartine House, Inchture. Highly commended—Mrs Fergusson Blair.
9. Best Bramahpootra Cock and Two Hens—The silver medal to Mrs Fergusson Blair, Inchmartine House, Inchture. Second—The bronze medal to Mrs Fergusson Blair, Inchmartine House, Inchture. Highly commended—Mrs Fergusson Blair. Commended—Lord Kinnaird, Rossie Priory.
10. Best Brahamapootra Cockerel and Two Pullets—The silver medal to Mrs Fergusson Blair, Inchmartine House, Inchture. Second—The bronze medal to Mrs Fergusson Blair, Inchmartine House, Inchture.
11. Best Malay Cock and Two Hens—The silver medal—*No entry.*
12. Best Malay Cockerel and Two Pullets—The silver medal—*No entry.*
13. Best Spanish Cock and Two Hens—The silver medal to Miss B. Ridpath, 128 Causewayside, Edinburgh. Second—The bronze medal to Dr F. J. White, Perth. Highly commended—Mrs Fergusson Blair.
14. Best Spanish Cockerel and Two Pullets—The silver medal to Archibald Campbell of Blythswood, Renfrew. Second—The bronze medal to William M'Intyre, Coalhill, Stair, Ayrshire. Highly commended—The Countess of Airlie, Cortachy Castle, Kirriemuir.
15. Best Golden Hamburg Cock and Two Hens—The silver medal to William Hay, 113 Union Street, Aberdeen. Second—The bronze medal to Samuel Pope, 35 Seamount Place, Aberdeen.

Glasgow. Second—The bronze medal to Robert Law, Shettleston, Glasgow.

8. Best Norwegian Harrow—L.3 to William Kirkwood, Duddingston Mills, Portobello. Second—The bronze medal to John Inglis, Craigour, Liberton.
9. Best Pulverising Land-roller—L.3 to the Trustees of W. Croskill, Beverley. Second—The bronze medal—*No entry.*
10. Best Consolidating Land-roller—L.3 to Robert Wight, Seton, Longniddry. Second—The bronze medal to the Trustees of W. Croskill, Beverley.
11. Best Land-presser for preparing Seed-bed for Grain—L.3 to Smith Brothers & Co., Kinning Street, Glasgow. Second—The bronze medal to the Trustees of W. Crosskill, Beverley.
12. Best Ribbing Machine—L.2 to James Kirkwood, Tranent. Second—The bronze medal—*No award.*
13. Best Harrows for Heavy Land—L.2 to John Gray & Co., Uddingston, Glasgow. Second—The bronze medal to George Ponton, Woolston, Linlithgow.
14. Best Harrows for Light Land—L.2 to Robert Law, Shettleston, Glasgow. Second—The bronze medal to John Gray & Co., Uddingston, Glasgow.
15. Best Harrows for covering Grass Seeds—L.2 to John Inglis, Craigour, Liberton. Second—The bronze medal to E. H. Bentall, Heybridge, Maldon, Essex.
16. Best Common Swing-trees for Two Horses—L.1 to William Gray, Cambusnethan, Wishaw. Second—The bronze medal to David Burns, Whitecross, Linlithgow.
17. Best Equalising Swing-trees for more than Two Horses—L1. to William Gray, Cambusnethan, Wishaw. Second—The bronze medal to William Gray, Cambusnethan, Wishaw.
18. Best Broadcast Sowing-machine for Grain—L.5 to Thomas Sherriff, West Barns, Dunbar. Second—The bronze medal to Alexander Dick, Smithy Green, Liberton. The Judges recommended a silver medal to James Moyes, Balwearie Mill, Kirkcaldy.
19. Best Drill Sowing-Machine for Grain—L.5 to Thomas Sherriff, West Barns, Dunbar. Second—The bronze medal to Thomas Sherriff, West Barns, Dunbar.
20. Best Sowing-Machine for Grass Seeds—L.5 to Kemp, Murray, & Nicholson, Stirling. Second—The bronze medal—*No award.*
21. Best Sowing-Machine for Turnips—L.3 to Robert Wight, Seton, Longniddry. Second—The bronze medal to Peter M'Lellan, Abernethy.
22. Best Sowing-Machine for Turnips with Manure—L.5 to Robert and John Reeves, Bratton, Westbury, Wilts. Second—The bronze medal to Robert Law, Shettleston, Glasgow.
23. Best Dibbling or Drop Sowing-Machine with Manure—The Premium of L.3—*No entry.*
24. Best Sowing-Machine for Mangold—L.3 to Charles Hay, Freelands, Ratho. Second—The bronze medal to Peter M'Lellan, Abernethy.
25. Best Sowing-Machine for Carrots—L.3 to Thomas Sherriff, West Barns, Dunbar. Second—The bronze medal—*No entry.*
26. Best Three-Row Sowing-Machine for Beans—L.2 to Thomas Sherriff, West Barns, Dunbar. Second—The bronze medal to John and William Anderson, Dunbar.
27. Best One-row Sowing-Machine for Beans—L.1 to John and William Anderson, Dunbar. Second—The bronze medal—*No entry.*
28. Best Machine for Pulverising Guano, &c.—L.3 to William Kirkwood, Duddingston Mills, Portobello. Second—The bronze medal to Thomas Sherriff, West Barns, Dunbar.

29. Best Machine for Distributing Guano—L.4 to Robert and John Reeves, Bratton, Westbury, Wilts. Second—The bronze medal—*No award.*
30. Best Liquid-Manure Distributing-Machine—L.3 to the Trustees of W. Crosskill, Beverley. Second—The bronze medal—*No award.*
31. Best Horse-Hoe for Drilled Grain Crops—L.3 to William and James Hunter, Samuelston, Haddington. Second—The bronze medal to Thomas Sherriff, West Barns, Dunbar.
32. Best Horse-Hoe for Green Crops—L.2 to William Millar, Airntully, Stanley. Second—The bronze medal to Robert Law, Shettleston, Glasgow.
33. Best Machine for Singling Turnips—L.3 to Peter M'Gregor & Sons, Keith. Second—The bronze medal—*No entry.*
34. Best Machine for Raising Potatoes—L.3 to Smith Brothers & Co., Kinning Street, Glasgow. Second—The bronze medal—*No award.*
35. Best Scythe for General Purposes—L.1 to James Smith, Lawhill, Auchterarder. Second—The bronze medal to James Smith, Lawhill, Auchterarder.
36. Best Fanners or other Machine for Winnowing Grain—L.3 to John Richardson, Brunton Place, Carlisle. Second—The bronze medal to John Richardson, Brunton Place, Carlisle.
37. Best Fanners or other Machine for Cleaning Grass Seeds—L.3 to John Richardson, Brunton Place, Carlisle. Second—The bronze medal to John Spence, Craigkelly, Burntisland.
38. Best Weighing-Machine for Grain—L.2 to Herriot & Co., 115 Græme Street, Glasgow. Second—The bronze medal to A. & W. Smith & Co., Eglinton Engine-Works, Glasgow.
39. Best Weighing-Machine, indicating from 1 lb. to 2 tons—L.4 to A. & W. Smith & Co., Eglinton Engine-Works, Glasgow. Second—The bronze medal to Herriot & Co., 115 Græme Street, Glasgow.
40. Best Straw-Cutter for Hand-Labour—L.2 to Picksley, Sims, & Co., Leigh, Manchester. Second—The bronze medal to Richmond and Chandler, Salford, Manchester.
41. Best Straw-Cutter for Power—L.3 to Richmond & Chandler, Salford, Manchester. Second—The bronze medal to E. Page & Co., Bedford.
42. Best Turnip-Cutter for Cattle—L.2 to E. H. Bentall, Heybridge, Maldon, Essex. Second—The bronze medal to John Wingate, Alloa.
43. Best Turnip-Cutter for Sheep—L.2 to E. H. Bentall, Heybridge, Maldon, Essex. Second—*No award.*
44. Best Turnip-Cutter for Sheep, attachable to a Cart—L.3 to Thomas Sherriff, West Barns, Dunbar. Second—The bronze medal to James Kirkwood, Tranent.
45. Best Machine for Pulping Turnips—L.3 to Picksley, Sims, & Co., Leigh, Manchester. Second—The bronze medal to E. H. Bentall, Heybridge, Maldon, Essex.
46. Best Root-Washer—L.1 to the Trustees of W. Crosskill, Beverley. Second—The bronze medal to Richmond & Chandler, Salford, Manchester.
47. Best Linseed-Bruiser for Hand-Labour—L.2 to E. H. Bentall, Heybridge, Maldon, Essex. Second—The bronze medal to Richmond & Chandler, Salford, Manchester.
48. Best Oilcake-Bruiser for Hand-Labour—L.2 to Richmond & Chandler, Salford, Manchester. Second—The bronze medal to E. H. Bentall, Heybridge, Maldon, Essex.
49. Best Grain-Grinder or Bruiser for Power—L.5 to Picksley, Sims, & Co., Leigh, Manchester. Second—The bronze medal to Richmond & Chandler, Salford, Manchester.
50. Best Steaming Apparatus for Food—L.5 to A. and W. Smith & Co., Eglin-

ton Engine-Works, Glasgow. Second—The bronze medal to Smith Brothers & Co., Kinning Street, Glasgow.

51. Best Feeding-Troughs for Byres—L.1 to John Robson, 47 Cook Street, Glasgow. Second—The bronze medal to Robert Brown, Ferguslie Fire-Clay Works, Paisley.
52. Best Feeding-Troughs for Sheep—L.1 to William Kirkwood, Duddingston Mills, Portobello. Second—The bronze medal to John Robson, 47 Cook Street, Glasgow.
53. Best Sheep-Fodder Rack—L.2 to William Kirkwood, Duddingston Mills, Portobello. Second—The bronze medal to James Kirkwood, Tranent.
54. Best Churn Worked by Hand—L.2 to Robert Tinkler, Penrith. Second—The bronze medal to Peter M'Lellan, Abernethy.
55. Best Churn Worked by Power—L.3 to Robert Tinkler, Penrith. Second—The bronze medal to James Eastwood, Blackburn, Lancashire.
56. Best Cheese-Press—L.1 to Smith Brothers & Co., Kinning Street, Glasgow. Second—The bronze medal to A. and W. Smith & Co., Eglinton Engine-Works, Glasgow.
57. Best General Set of Dairy Utensils—L.2 to Philip Hunter, 64 Nicolson Street, Edinburgh. Second—The bronze medal—*No entry.*
58. Best One-Horse Cart, with Harness-Frame—L.4 to Alexander Scrimgeour, Methven, Perth. Second—The bronze medal to Robert Young, Auchterarder.
59. Best Harvest-Cart—L.4 to John and William Anderson, Dunbar. Second—The bronze medal to James Williamson, Camplebridge, Thornhill.
60. Best Light Spring-Cart—L.2 to the Trustees of W. Crosskill, Beverley. The Judges awarded a silver medal to Pirrie & Anderson, Perth, for a good and cheap Dog-Cart, though not of a class to compete in this section.
61. Best Wheelbarrow—L.1 to Alexander Scrimgeour, Methven, Perth. Second—The bronze medal to William Gray, Cambusnethan, Wishaw.
62. Best Barrow for conveying Cooked Food—L.1 to John Wingate, Alloa. Second—The bronze medal—*No award.*
63. Best Fittings for Farm Stables—L.2—*No award.* Second—The bronze medal—*No award.*
64. Best Farm Harness—L.1 to Hay Downie, Corstorphine, Edinburgh. Second—The bronze medal—*No entry.*
65. Best Stack-Pillars, with Framework—L.2 to William D. Young & Co., Edinburgh and Glasgow. Second—The bronze medal to Thomas Perry & Son, 9 Renfield Street, Glasgow.
66. Best Field-Gate constructed entirely of Iron—L.1 to William D. Young & Co., Edinburgh and Glasgow. Second—The bronze medal to Thomas Wight, Perth.
67. Best Field-Gate not constructed entirely of Iron—L.1 to Thomas Gorrie, Perth. Second—The bronze medal—*No award.*
68. Best Dunghill-Gate, to open at different Elevations—L.1—*No award.* Second—The bronze medal—*No entry.*
69. Best Iron Hurdles for Cattle-Fence—L.1 to William D. Young & Co., Edinburgh and Glasgow. Second—The bronze medal to Thomas Wight, Perth.
70. Best Iron Netting for Sheep-Fence—L.1 to Thomas Wight, Perth. Second—The bronze medal to William D. Young & Co., Edinburgh and Glasgow.
71. Best Wooden Hurdles or other Fencing for Sheep—L.1—*No entry.*
72. Best Pipe or Tile Machine for Hand or Power—L.8 to George Finlayson, Gighty Burn, Arbroath. Second—The bronze medal to E. Page and Co., Bedford.
73. Best Tiles or Pipes for Field Drainage—L.2 to Christie & Son, Shore

Road, Stirling. Second—The bronze medal to Alexander Meldrum, Seafield Tile-Works, St Andrews.

74. Best Glazed Socketed Pipes for Sewerage—L.3 to John Robson, 17 Cook Street, Glasgow. Second—The bronze medal to Robert Brown, Ferguslie Fire-Clay Works, Paisley. Commended—The Edmonstone Coal Co., Dalkeith.

75. Best Tools for Cutting Field Drains—L.1 to Michael Jack, Peggy's Mill, Cramond. Second—The bronze medal—*No entry.*

76. Best Tools for Cutting open Drains in Hill Pastures—L.1 to Michael Jack, Peggy's Mill, Cramond. Second—The bronze medal—*No entry.*

77. Best General Set of Hand Implements for the Farm—L.2 to James Douglas Allan, Culthill, Dunkeld. Second—The bronze medal to William Millar, Airntully, Stanley, Perthshire.

78. Best Gas Apparatus for Country and Farm Houses—L.5 to J. T. B. Porter & Co., Lincoln. Second—The bronze medal to J. T. B. Porter & Co., Lincoln.

EXTRA IMPLEMENTS, MACHINES, &c.

The Judges HIGHLY COMMENDED *the following:—*

Hand-Rake, belonging to John Anderson, Monifieth, Dundee.
Grass-Mowing Machine, belonging to W. M. Cranston, 58 King William Street, London.
Combined Reaping and Mowing Machine, belonging to Kemp, Murray, and Nicholson, Stirling.
India-Rubber Belting for Thrashing and other Machines, belonging to the North British Rubber Company, Edinburgh.
Dry Deodorising Closets, belonging to George Smith & Co., 64 Port Dundas Road, Glasgow.
Horse Stubble or Hay Rake, belonging to Mr Wilson, Errol.
Collection of Vases, Paving Bricks, Horse Mangers, Pig Troughs, and Milk-Coolers, belonging to John Robson, 47 Cook Street, Glasgow.

The following were COMMENDED:—

Steam-Engine for Thrashing purposes, belonging to Bate, Stewart, & Co., Perth.
Reaping Machine, belonging to George Bell, Inchmichael, Errol.
Combined Reaping and Mowing Machine for two Horses, belonging to J. and J. Gillespie, Kingsbarns, St Andrews.
Corn Meter, belonging to Thomas Gorrie, Perth.
Horse Rake for Hay or Stubble, belonging to James Kirkwood, Tranent.
Argand Furnace Bars, belonging to William Lincoln, 77 John Street, Glasgow.
Right and Left Hand Plough, belonging to Thomas M'Cririck, Cumnock.
Turnip Lifter, belonging to David Martin, New Scone, Perth.
Border Dipping-Tubs, belonging to Joseph Rawdin, Jedburgh.
Oat and Bean Bruiser for Power, belonging to Smith Brothers & Co., Kinning Street, Glasgow.
Rye-Grass Sieve, belonging to Thomas Wight, Perth.
Two Garden Seats, belonging to John T. Alexander, Carnoustie.

EXPERIMENTAL AGRICULTURE.

An Address delivered at the PERTH SHOW of the HIGHLAND and AGRICULTURAL SOCIETY, 1861.

By THOMAS ANDERSON, M.D., F. R. S. E., Chemist to the Society.

THERE is no point in regard to which opinions have undergone a more complete change than in all that relates to the application of experiment to the elucidation of agriculture. The time is not long gone by when to call a man an experimental farmer was the reverse of complimentary. Persons so described were looked upon, even by the best informed and most intelligent farmers, as theorists who indulged in vague and uncertain speculations, altogether distinct from and often diametrically opposed to, the well-determined facts which practice taught, and more likely to mislead than direct. While, at the present moment, those who engage most actively in the prosecution of agricultural experiments are the very men whose opinions, on purely practical points, are most highly valued, and in devoting time and labour to such inquiries, they are justly considered to confer a benefit on agriculture.

It is not difficult to trace the cause of this change, for when the past progress of agriculture is studied, it is impossible to avoid seeing that the old as well as the new opinions are equally well founded. The old experimenters were really blind guides, because they had no definite principles to direct them. They tried experiments at random, and used this or that substance, not because there was any good reason to suppose that it was capable of giving beneficial results, but merely on the chance of something of interest or importance turning up. They went to work empirically; and though in this method it is quite possible to obtain knowledge, as in fact a far from inconsiderable part of all human knowledge has been so acquired, still it is done with a vast expenditure of labour, and the results of a single observer are of little value. And this is taking the most favourable view of the case. It was far worse if the observer, in place of patiently accumulating empirical facts, happened to be fired with an idea—for he then disregarded observation—and, dashing boldly on in pursuit of it, he ended by floundering in the slough of error, when he ought to have been slowly wending his way over the stepping-stones of truth. The great want of the old experimenter was guiding principles, which in his time did not exist, and therein lay the cause of the discredit into which he fell; while the modern experimenter is directed in the right path by well-defined and definite principles, founded on a careful and minute study of known facts, by an inquiry into the causes on which they depend, and by passing from the known to the unknown by slow and cautious steps, and never advancing except where a sure and certain footing can be obtained. The truth is, that the progress of the experimental sciences has affected the progress of the practical

arts, among which agriculture is included for a much longer time and to a much greater extent than is usually supposed, has gradually changed the character of arts on which its influence has scarcely been observed or suspected, and produced a more thoughtful and philosophical spirit among the general population. And this is the real cause of that change of opinion which has taken place regarding the value of agricultural experiments, which is so obvious even to the least observant eye. Agriculture, within the last twenty years, has begun to take on a scientific form; it has imported into it knowledge derived from other sources, and whether he be acquainted with science or not, every one now engaging in agricultural pursuits ought to know that he is handling a scientific art; and the more clearly and distinctly this change and its inevitable consequences are recognised, and the more quickly the practical farmer accommodates himself to it, the more rapid will be the future progress of agriculture. That there is a keen desire to do this is very obvious to every one who looks at what has recently been done, and it must be admitted the farmer has shown a remarkable elasticity in suiting himself to the altered position of his art, and has given a practical refutation of the popular opinion, which pictures him as a man obstinately wedded to old ideas, slow to move, of retrospective rather than prospective tendencies, and more ready to till his fields as his father did before him, than to adopt any novelty. I am far from asserting that there may not be individuals to whom this description still applies, but it is certainly very far from correct as regards the best farmers. They readily, sometimes perhaps too readily, adopt every new suggestion, are always prepared to unite in the prosecution of experiments, anxiously and carefully canvass the mode in which they ought to be conducted, criticise the results, and endeavour to trace the causes of the discrepancies which may be encountered, so as to make them the starting point for new experiments. And they are encouraged and assisted in this course by the different agricultural societies, which have done their best to foster the spirit of inquiry; and our own Society has taken a prominent part in this respect by the judicious system of prizes it offers, and its Transactions contain the result of an immense mass of field experiments, which sufficiently indicate the zeal, perseverance, and energy of its members.

Watching, as I must necessarily do, the progress of scientific agriculture with a somewhat careful eye, I am naturally led to study the results of the experiments made in different parts of the country, and to compare and contrast them with each other; and, in doing so, points are constantly suggesting themselves which merit the attention of experimenters, and, if kept in view, might facilitate experiments, render them more valuable, and enable better and more useful results to be obtained with a less expenditure of

labour, both by determining what has been well ascertained and by directing attention to those points not thoroughly studied, but which deserve to, and might easily, be more minutely investigated.

My object on the present occasion is to discuss some of these matters, and more especially to consider the mode in which experiments ought to be conducted, and the precautions which must be taken if they are to be successful and trustworthy. I am well aware that within the limits of an address like the present it is impossible to do full justice to a subject so multifarious, and embracing so large a mass of details. My original intention was to have examined and discussed the various experiments already made, to compare them with one another, and to ascertain the general results to which they lead. But it soon became obvious that this course must be abandoned, not merely on account of its extent and difficulty, but still more because it was impossible to avoid numerical details, which are unsuited to an address, are tedious, unattractive, and confusing, and only to be understood when quietly studied. To me, however, the inquiry, though in many respects less satisfactory than I could have wished, was very instructive, for it showed me that the number of experiments in which all the data necessary for arriving at a trustworthy result had been determined, was fewer than might be supposed, and that in many cases the experimenters had not been fully alive to all the minutiæ which go to the performance of a really good experiment, and justified my intention to discuss the subject in its general bearings, and to restrict myself very much to pointing out the requisites of a successful experiment, and some of those points which may be studied in the field with advantage to scientific and practical agriculture.

While I have stated that a large number of the experiments hitherto made are defective, the force of this observation must not be misunderstood. The defects in question are due in great part to the progress of agriculture, for many of the earlier experiments were excellent at the time they were made, and embraced all that was then necessary; but the increase of our knowledge has shown the importance of many points which formerly appeared of little moment, and such experiments require repetition, not because they are erroneous, but because something requires to be added to them. And in this respect agriculture fares exactly as other branches of human knowledge; for when we come to look at the history of any art or science, we are astonished to find how much requires to be undone, and done over again often more than once. The fact is, a great part of the experiments we make bear to the science they are meant to extend somewhat the same relation that the scaffolding does to the building it is used in constructing, and which is destined to disappear when the edifice is complete. In raising the great structure of human knowledge the majority of the workmen are engaged on the scaffolding or the foundation, which is hidden underground; few are occu-

pied in rearing the building itself, fewer still are destined to add to it a tower or pinnacle which attracts the eye; and rarest of all is the case of him who has the genius or the good fortune to unite two separate portions into one great harmonious whole.

In agriculture we are now just laying the foundation, in some parts only preparing the ground; and, beyond a doubt, many of the experiments now made are destined to disappear and be replaced by others, but they are not on that account the less necessary, nor is the merit of those who make them the less. But just as we know that the skilful architect will obtain equal strength with a smaller expenditure of material, so in experiments it is possible to economise labour, and thus to arrive more rapidly at the wished-for end.

Now, the object of all agricultural experiments is a practical and economical one. It is that of increasing by artificial means the productive capacity of the soil. But this result may be arrived at either directly by the study of a particular case, or indirectly by establishing general principles. The former method is limited in its application, the latter is more extended and capable of being applied under a variety of circumstances, and has, consequently, a higher value. But while this is a position which will unquestionably meet with the concurrence of every one who studies the subject, it will generally and naturally be found that, when a farmer undertakes experiments, he will prefer the former course, because his object will in most instances be a personal one. He seeks to ascertain how he can most economically and profitably cultivate his own farm, and the general question, so far as it relates to cultivation generally, has for him only a secondary importance. Thus, for example, if he has resolved to contrast with one another the action of two manures—such as Peruvian guano and superphosphate—it is enough for his purpose to find that one of them, say Peruvian guano, has been more profitable on his soil, and here, so far as he is concerned, the matter may be said to terminate. But if he is an observant individual, he finds that many other points are worthy of consideration. His neighbour perhaps has obtained a diametrically opposite result, and he is led to inquire into the cause of this discrepancy, when it probably turns out that his neighbour cultivates a light and he a stiff soil; and he sees that, provided the special conditions of the experiments be attended to, they acquire a wider significance, and may be made important to the general agricultural community. The further he goes the more distinctly does he become convinced of the fact that his results have only a relative significance, but that they may be made of general importance by attending to the varying conditions under which they are obtained. Advancing still further, he comes to inquire into the particular substances to which Peruvian guano and superphosphate owe their actions; and, finding that the former

contains a large quantity of ammonia, and the latter chiefly phosphoric acid, he is led to generalise, and to assert (whether correctly or not, does not for the moment signify) that ammonia is adapted to some soils and phosphoric acid to others.

In the great majority of instances the farmer stops far short of this, and is content to compare with one another the manures made by different manufacturers, for the view of ascertaining which is best fitted for his purpose. Now there is no doubt that, at first sight, this course has considerable practical advantages; but it has also many great disadvantages, and one of the greatest and most important of these is that such experiments are apt to become advertisements to rival manure manufacturers. Observe what actually occurs. A farmer compares the manures of three different makers, whom we shall call A. B. and C., and finds that A.'s gives by far the best result. Forthwith Mr A. prints the results of these experiments on a sheet, in which the excellent effects of his manure are set forth in large and conspicuous type, which attracts the eye, and circulates it among his customers. Mr B., perceiving this, carefully scrutinises the agricultural periodicals, where he soon finds a set of experiments in which his manures gave a very large crop, while Mr A.'s and Mr C.'s stand in a very inferior position, which he sends to his customers; while Mr C. of course adopts the same plan, and selects a set of experiments which suit his purpose. Now here is a case in which experiments are positively injurious. No doubt the results are all equally correct, but of what real use are any of them, unless the conditions under which the results were got are properly understood?

If now the subject be further prosecuted and the exact nature of the three manures be inquired into, it will probably be found that they are all nearly identical in composition, and are made from the same raw materials; the fact being that, by whatever high-sounding name they may be described, most manufactured manures are essentially superphosphates, made from bones, bone-ash, coprolites, sulphate of ammonia, and in some few instances a salt of potash. Excluding the latter, therefore, which is seldom employed, all manufactured manures may be said to consist of phosphates rendered soluble by acids, and of ammonia, and the particular sources from which these substances are derived are of less moment than might be at first sight supposed. If now, instead of taking the manures of different makers, their chemical composition only be attended to, it is obvious that the conclusions drawn from them would be of much greater importance; for should it be found that the effects obtained were due to some particular element, or to the admixture of several in particular proportions, and the conditions under which these substances acted most favourably were properly ascertained, each individual would be able to draw his own conclusions, without the risk of being misled by the chance

of the advertisement of this or that manufacturer falling into his hands. The more minutely these and the other considerations to which they lead are weighed, the more firmly shall we be convinced that though involving a certain amount of delay, the establishment of principles is the most important aim of experiment; but as from the very nature of agricultural investigations a mass of facts must be accumulated before conclusions can be drawn, the best course is to make them in such a manner that they may in the mean time be individually useful, while they are also contributions to that more extended and general information which is so important.

Whatever method the agricultural experimenter may resolve to adopt, there are a variety of matters to which it is necessary for him to attend if he wishes his results to be valuable; and these we shall endeavour to discuss as minutely as possible.

In the first place, then, it is of paramount importance that the experimenter should have a definite object in view. He should set out by carefully considering the nature of the facts he wishes to establish, and examining the literature of agriculture in order to ascertain whether similar experiments have been made before. It by no means follows that, even should this be the case, it is unnecessary to repeat them, because, from the varying conditions of soil, season, and the like, the same experiment should in all cases be repeated several times. If he finds any previous results they should be carefully studied, and should they show any discrepancies the cause ought to be inquired into; and in those which he is about to make, he should endeavour as far as practicable to arrange the conditions so as to eliminate their source. In many cases, of course, it may not be possible to do this, but wherever it is, the advantages are sufficiently obvious, for it saves labour, prevents the unnecessary repetition of experiments, and enables those who are willing to work to devote themselves to other matters of interest.

Having settled all these points, it is of the utmost importance that the experimenter should not undertake too much. He should bear in mind that the most essential part of his experiments, and that which more perhaps than any other requires his personal superintendence—namely, the weighing of the crop—must take place at harvest-time, when he himself and his men are all most busily occupied, and when it is difficult to find hands to do what is absolutely required. It should never be forgotten that what can be done without much trouble at spring-time is not so easily accomplished in autumn; and the risk is that, if too much be undertaken, the weighings are slurred over, and the experiments become valueless, or, what is worse, misleading. The most common error is undoubtedly that of beginning more experiments than can be satisfactorily brought to a termination. The experimenter sees that there is scarcely a branch of agriculture in which there is not

abundant room for work, and, feeling interest in several points, he seeks to arrange his experiments so as to include as many as possible, and he either breaks down or renders his results indefinite and unsatisfactory. He may rest assured that one good experiment is worth a hundred indifferent ones, and that it is best in every way for him to concentrate his energies on a limited field, and to endeavour to vary his experiments within a narrow circle, in such a manner as to give precision to his results and eliminate all the sources of error. It is in this way that his labours are most likely to become permanent contributions to agricultural science; and his name will be remembered as that of one who has promoted his art, when those who have been more discursive in their efforts will be forgotten.

The next point to be considered is that of determining the field on which the experiments are to be made; and this is a matter affording much scope for care and attention. In the first place, it is not advisable that the land should have been in the highest state of cultivation, nor should it have received any large and unusual manuring, because in the former case the differences in the effect of the substances applied are less conspicuously brought out, and, in the latter, the unexhausted manure of the former application may interfere to a greater or less extent with the results. Care should also be taken to insure uniformity of soil and treatment of every part of the field; and there is no point which merits greater attention, for the absence of proper precautions to attain it is one of the most fertile sources of fallacious experiments. No one who has not learned from practical experience can have any idea of how difficult it is to find even three or four acres of soil of absolutely uniform characters or composition, and yet experimenters often omit to adopt any means of ascertaining the limits within which the crop produced on any soil varies. The only mode commonly adopted is to make the experiments in duplicate; but this, though a precaution which ought never to be omitted for other reasons, is not all that is requisite. The fact is that, to get really good results, the spaces on which experiments are to be made should be fixed the year before, and the ordinary crop of the rotation being grown in the usual manner over the entire field, the quantities produced on each of these plots should be separately weighed, and thus the limits of the natural variation determined. Strictly speaking, this should be done for more than one year, because different seasons produce different effects. Thus, for example, during a dry season the crop over a whole field may be quite uniform, but during a moist year, from one part of the field lying lower or on a more retentive subsoil than the other, a difference may be developed. And hence, if the most perfect results are aimed at, it is requisite to ascertain the effect which special states of weather have in developing what may be called the latent peculiarities of different portions of the field.

It is scarcely to be expected that the experimenter should in general be in a condition to do all this, and to provide so long beforehand for the experiments he is about to make, but some attempt should undoubtedly be made to avoid the most conspicuous sources of inequality. He should at all events select a portion of a field known to yield a tolerably uniform crop, which has a soil of uniform texture, resting throughout on the same kind of subsoil, and should avoid one of whose general productive capabilities he is ignorant. He should bear in mind, however, that mere ocular inspection of a crop is a very fallacious guide as to its uniformity. Indeed, every practical farmer knows how easily he is thus misled, and how constantly it happens that crops which are estimated as nearly the same differ very widely when brought to the test of weight; and the reason is, that the eye judges by the general appearance of the crop, and not by the portion of it which is valuable. In illustration of this, reference may be made to the familiar fact that the luxuriant growth of the leaves of the turnip does not always prove that there is a proportionate development of bulb, although it may very often do so; and many similar instances will immediately occur to any one who considers the matter.

Whatever method of determining the uniformity of the soil is adopted, all experiments should be made in duplicate; and this is just as necessary where the absolute uniformity of the soil has been well ascertained as where it has not, because the same manure tried on two separate plots of the most uniform soil does not always produce the same result; and instances may be found in which most startling differences have been observed. Thus, for example, Mr Main of Whitehill, the accuracy of whose experiments is well known, applied a mixture of various manures to the green-globe turnip, in three different proportions, and obtained the following results:—

	Bulbs.	Tops.
1532 lb. of mixture gave	21 tons 10 cwt.	6 tons 2½ cwt.
1732 "	19 " 10 "	5 " 10 "
1932 "	22 "	6 " 2½ "

The smallest quantity of manure in this case giving a produce almost exactly equal to the highest. Many similar instances of differences quite as large as these might be quoted, the cause of which the experiments themselves afford no means of explaining, although it is reasonable to suppose that they may, in many instances, be due to fundamental differences of soil which have not been properly ascertained.

The plots on which the different manures are applied should be so arranged that the duplicates may be as far apart as possible, and if any differences are to be observed in the soil or exposure of the field, they should be placed so as to have one on each

part. Thus, if the ground has a considerable slope, one plot of each manure should be on the upper part, and the other on the lower, and such similar precautions should be taken as circumstances may dictate. These matters may in many respects appear very trifling, but they are of the very highest importance in practice, and not unfrequently make the difference between a valuable and a worthless experiment.

The size of the plots on which the experiments are to be made is also a matter involving many important considerations. It is usually maintained that the larger they are the better, and there is no question about the advantage of making experiments on a considerable scale, but I have no hesitation in stating that this may be carried too far. It is obvious that when the plots are of considerable size the risk of errors arising from inequality in the characters of the soil is, to a certain extent diminished; but this again is counterbalanced by the consideration that we proportionately reduce the number of experiments made, because there are many persons who might be inclined to devote an acre or two to a series of experiments who would grudge the extra space, trouble, and expense which would be entailed if each plot were to be of that extent. The fact is, that the size of the spaces may be very moderate, provided the experimenter is careful and the soil has been proved to be of uniform quality, and thus preliminary experiments extending over a year or two, made with the express intention of establishing this point, may, in the long-run, be the source of material economy. Where the plots are small, the chief direction in which risk of error is to be encountered lies in the necessity for more careful measurement, and in the chance of the manures being mixed at the edges of the adjoining spaces, or the roots of the crop passing over and taking advantage of the manure not intended for them. These sources of error must exist in all experiments, but where the breadth of land in which they are made is considerable, they are so minute as to be quite insignificant, although where the plots are small they become of serious magnitude. They may, however, be altogether avoided, provided care be taken not to place the spaces in immediate contact with one another, but to have a narrow strip of unmanured land between each. If this precaution be observed, there is no reason why very moderate-sized plots should not be employed; and it is perfectly possible that the results obtained, with proper care, from a sixteenth of an acre, might greatly exceed in accuracy and value those from a whole acre in which these minute points have not been attended to. Whatever quantity of land be given to each plot, it is of the utmost importance that the entire produce obtained from it should be weighed. It is not an uncommon practice for experimenters, after taking considerable plots, to weigh the crop obtained from a part of them only. Thus, for example, if the ex-

periment is on turnips, many persons are content to measure off a certain length of drill in each case, and weigh the produce of it only; but it should never be forgotten that, when this is done, whatever may be the breadth of land manured, the *experiment* is made only on that portion of which the crop was weighed. It is very difficult to fix definitely the size of the plots which should generally be adopted, and many circumstances must necessarily influence the experimenter in his choice. From a quarter of an acre to an acre may, however, be mentioned as convenient quantities, although there is no reason to doubt that an eighth or even a sixteenth of an acre may be employed, provided the precautions already mentioned be attended to; but in that case the experimenter will bear in mind the necessity for the greatest possible care.

Supposing the size of plots to have been determined, the land is then to be carefully measured out, and marked with large, distinct, and permanent pins fixed in the corners of each plot, enough being measured to give two spaces for each manure, and two without any application, for comparison. The latter should never be omitted, as indeed must be sufficiently obvious; but it is particularly necessary to refer to this, because, strange as it may seem, a considerable number of experiments, otherwise well performed, could be pointed out, which are rendered almost valueless by the omission of this most important datum.

This being accomplished, the manures ought next to be prepared for application; and for this purpose the quantity to be used should be turned out of the bags upon a clean stone or wooden floor, carefully mixed with spades, breaking down any lumps, and the whole passed through a sieve. A sample should then be taken for analysis, by lifting a handful from each of five or six parts of the heap, which should immediately be put into a dry bottle, and preserved for analysis. It must be distinctly understood that the sample for analysis ought always to be taken from the individual quantity of manure used, and with the greatest possible care. It is not sufficient to take it from another portion of the stock, still less to rely upon the analysis supplied by the manure manufacturers, because it is impossible on the large scale to secure complete uniformity; and though the analysis furnished with the manure may correctly express the composition of the particular sample examined, it may be very far from that of the small quantity used in the experiment.

It is very desirable also that the soil should be analysed and examined as to its physical properties; but I hesitate to advise this being done, because our knowledge of its chemistry is still so imperfect that it is often impossible to derive any definite conclusions from it. No doubt, if the chemical and physical properties of the soil could be determined, results of much interest might be obtained, but as this would involve a series of laboratory experiments infinitely more extensive and laborious than those made in the

field, it is not likely that they will often be undertaken. And the best proof of this is to be found in the fact, that neither at Rothamsted, nor at the German Agricultural Experimental Stations, to all of which skilful chemists are attached, has any attempt been made to supply complete information on this point. In the present state of scientific agriculture, it would be infinitely preferable to endeavour to obtain some information regarding the meteorology of the season in which the experiments are made, and more especially to determine the amount and distribution of the rainfall. It is unnecessary to refer to the extent to which the weather influences the produce, for that is one of the most patent of all facts; but it is worthy of notice that, familiar as it is, no agricultural experimenter has yet attended minutely to it, or endeavoured to find out its nature and extent, although it may be safely averred that there is no subject of more importance; and any one who would conjoin the regular observation of the rain-gauge on the field itself with his experiments would do a very great service to agriculture. It cannot be doubted that attention to the meteorological peculiarities of the season would assist in explaining some of the remarkable discrepancies often observed in agricultural investigations.

Universal experience has taught us that certain kinds of weather are suitable to particular crops, and hence it is that the moist climate of Scotland is favourable to the turnip, while the drier climate of Southern England is better adapted to the mangold. And what is true of the crops is equally applicable to many manures. Thus, for example, a wet season is unfavourable to the action of nitrate of soda, and a heavy and continued fall of rain soon after its application may render it quite ineffective; and the reason for this is to be found in the fact that the soil has no tendency to retain nitric acid, although, as it possesses the property of absorbing ammonia, a wet season is not injurious to manures containing that substance. And hence, also, it is obvious that differences observed in the effects of nitrate of soda may often be due to partial showers at or soon after its application, the occurrence of which may never be taken into consideration.

When the crop has reached maturity, the time at which it should be harvested and weighed is a point of very great importance, and gives scope for much exercise of judgment and attention on the part of the experimenter. The usual practice, as is well known, is to collect the produce of each plot on the same day; but this is a most fallacious plan, and has no doubt led to many of those discrepancies which appear so puzzling. The disadvantages of this mode of proceeding become obvious when we consider the well-known fact that certain manures cause the crop to arrive at perfect maturity sooner than others, and this point ought in all cases to be taken into consideration; for unless the produce of each plot be taken when fully ripe, no comparison can be instituted between them; and when it is borne in mind that there may be a difference

of a week or even a fortnight in the ripening of the different portions, it is easy to see that, unless this be attended to, the results may be most fallacious. Of course, if the whole of the produce be allowed to stand until the latest plot is thoroughly ripe, the error will not be so serious; but it is not altogether avoided, because the over-ripe crop is exposed to risk while waiting for the others. If it be a grain, for example, and the weather be windy, a portion of it may be shed. Or if rain falls, the over-ripe crop may be beaten down, and the grain may sprout, or be otherwise injured.

Supposing the experiment on the field to be successfully terminated, the crop housed and weighed, there comes last of all the question, whether its weight is an accurate test of its value? In general it is assumed to be so, but we know very well that this is not an accurate assumption. If a grain, for example, it will vary in quality, and its bushel weight and appearance will form an important element in determining the price given for it. If these points be accurately determined, the commercial value of the produce may be fixed, and, so far as practical conclusions are concerned, all that is requisite in the case of a grain may be looked upon as ascertained; but it must be borne in mind that the composition of the produce may vary, and this, though commercially of little importance so far as the cereals are concerned, is of the very highest moment in relation to the root crops, and has an extremely important influence on their value. Thus it is no uncommon occurrence to find two crops of turnip, one containing 8 and the other 10 per cent of solid matters—that is, of real nutriment; and it is obvious that, if one experiment gave 20 tons per acre of a turnip containing 8 per cent of solids, and another 16 tons containing 10 per cent, and the weight alone were relied upon, the former would be considered greatly to surpass the latter, although, in point of fact, they would be exactly equal. Hence it may be inferred that, in order to attain perfection, the crops should be analysed, so that their composition may be determined. Nay, we may go still further, and add that, in the case of a substance used as cattle food, its nutritive value should be determined by actual feeding experiments, and that the grain should be sent to the mill, and the proportion of bran, and coarse and fine flour it yields be ascertained.

It will be seen from what has been said that the precautions required for obtaining really good experiments are very numerous, and that where very great accuracy is required, much care, attention, and labour are requisite. Although it is especially desirable that the different precautions which have been referred to should be attended to as far as possible, it is not to be expected that it will be generally, or even often, possible for the farmer to fulfil all of them. Some are quite within his power—such, for example, as attending to the perfect ripeness of the crop, and so on; others, however, entail so much trouble and cost that they will in general be omitted. And though this will, no doubt, diminish

the value of his experiments, it is very far indeed from making them useless, and he may do good service to agriculture by anything he does with care. It has always appeared to me, however, that the most easy mode of securing accurate experiments would be for a few farmers to unite together and take up a definite line of inquiry, so as to divide the labour among them, by which means it would be quite possible to secure the observance of almost all the precautions I have described as necessary. In this way it would be possible to lay out a definite plan of experimenting, in which each would take that part of the work which suited him, and there would also be the advantage of prosecuting one subject through a succession of years, and thus ascertaining the effects of season and the continued action of manures.

If eight or ten, or even five or six individuals, would combine for this purpose, and restrict themselves to a limited series of experiments, the result of a few years' labour would produce an amount of information which, in point of precision and value, would very greatly exceed the ordinary run of experiments. But for this purpose it would be essential that they should sink their individuality, and resolve to work together for the common good; and this is in fact the main difficulty, for each individual has generally some favourite subject or some point which appears to him of greater importance than others, which he naturally wishes to see examined in the first instance. But the principle of conjoint experiments is so important that it is worth any sacrifice to secure them.

Such being the various points requiring the attention of the experimenter, it is now necessary to consider the individual matters deserving investigation. It may be asked, indeed, what those subjects are which do not require to be studied, for there is scarcely a department of agriculture on which labour may not be profitably expended, and it is astonishing to observe how difficult it is to find definite information even on the most fundamental points. The experimenter may therefore make up his mind that there is no difficulty in finding matter for inquiry, and that almost anything he does will be valuable, although naturally there are some subjects of more general interest and more universal importance than others, and which it is above all things desirable to have clearly established. Among these may be particularly mentioned the conditions under which the more common artificial manures may be most usefully applied. Of course many experiments have been made in which these substances are compared with one another, but it is not so easy to ascertain the relations they bear to farmyard manure. In many instances these substances, and more especially Peruvian guano, are used as substitutes for dung. Thus a farmer has resolved to give to a particular crop 20 tons of manure, but he runs short, and, desiring to use Peruvian guano to make up the deficiency, the question arises,

How much of the latter is equivalent to a ton of the former? That is to say, how much guano should he use with the prospect of obtaining an amount of crop equal to that which the dung will give? There is no point in regard to which greater differences of opinion exist among practical men than this, and the reason no doubt lies in the fact that the two things are not strictly comparable, their mode of action being in many respects different.

Dung not only acts during a whole rotation, but produces certain chemical changes on the soil, promoting those decompositions which are so necessary for bringing its various constituents into the state in which they are most suitable for the plant; while guano is limited in the time of its action, and does not promote, at least to any extent, the decomposition of the soil. Notwithstanding these obvious differences, it would be very important to have a more definite idea on this point than can be derived from the facts at present at our disposal; and, for this purpose, it would be necessary to have several series of experiments made in different parts of the country, in such a manner as to be completely comparable, and continued through several seasons, and on different descriptions of soil. Suppose 20 tons of farmyard manure to be used as the standard, another plot might be manured with 10 tons and 3 cwt. guano, another with the same quantity of manure and 4 cwt. guano. Further, there should be spaces without dung, but with 6 and 8 cwt. of guano per acre, and also others in which 10 tons of farmyard manure used alone are contrasted with the effect of 3 and 4 cwt. of guano alone.

The whole experiment might be arranged somewhat after the following scheme:—

20 tons farmyard manure.	10 tons farmyard manure and 3 cwt. guano.	Nothing.	3 cwt. guano.	10 tons farmyard manure and 4 cwt. guano.	8 cwt. guano.	10 tons farmyard manure.	6 cwt. guano.
3 cwt. guano.	8 cwt. guano.	10 tons farmyard manure.	6 cwt. guano.	20 tons farmyard manure.	Nothing.	10 tons farmyard manure and 3 cwt. guano.	10 tons farmyard manure and 4 cwt. guano.

Larger quantities of manure might be used on the same principle if it be thought necessary, and portions of the experiments might be omitted if the individual considered their number greater than he could accomplish. Various modifications would also be introduced in particular instances; indeed it would be advisable to leave experimenters considerable latitude in their choice, but it is essential that in all cases the experiments should be performed in exactly the same manner by more than one experimenter.

The permanence of the action of different manures is a matter affording a large field for inquiry, and on which our present information is very scanty. It is well known that some manures have no permanent effect, but exhaust their whole influence on

the crop to which they are applied, and act chiefly as stimulants, as they have been called; that is to say, they add little to the soil, containing perhaps only one or two of its essential elements, and act by bringing into play its latent capabilities, and causing those substances which lie dormant in it to pass into the plant, and so become useful. This is particularly the case with nitrate of soda, and every one must remember the interest which was excited some years since by some experiments of the late Mr Pusey, in which an extremely small application of that salt produced a very remarkable increase in the crop. Now, in such a case nothing is added but a small quantity of nitrogen, which has caused the increased crop to take from the soil all the other constituents which it required; and hence it may be asked, whether such an application may not diminish the subsequent crop by taking away their substances, which it would be most likely to avail itself of.

The only experiments bearing upon this point are some made many years since by Kuhlman, which go to show that a diminution of the subsequent crops does really occur in some instances. A repetition of these experiments under varied circumstances would be of much importance. A still further extension of such inquiries to the effect of manures over a complete rotation is also much wanted, for it is a point on which there is almost no information in existence.

Another important subject of investigation is to be found in the determination of the circumstances connected with the use of superphosphate, which, as one of the most important of all artificial manures, requires especial study. The ground upon which the use of this manure was founded was, that by rendering the phosphates soluble they become more accessible to the plant. It is now known, however, that plants do not take their food from solution, hence the principle is wrong; and, moreover, no sooner does a superphosphate become distributed through the soil than the lime and other substances with which it comes in contact bring back the phosphates into their original state of insolubility, although of course they are more effectually spread through the soil than they would otherwise have been.

It is more probable, therefore, that it is the minute subdivision, and more intimate admixture with the soil, produced by rendering its phosphates soluble, which has been influential in promoting their action; but if this is so, what would be the effect of using a larger quantity of insoluble phosphates? A ton of superphosphate contains about 7 cwt. of phosphates, soluble and insoluble, and costs about £7. For the same money, the farmer may buy in the shape of bone-ash 16 or 17 cwt. of phosphates, and in that of coprolites 30 to 35 cwt. What effect, then, it may be asked, would be produced by the application of a ton of ground coprolites to the acre? Although it might be less at first, might not its permanence of action render it as useful or more useful in

the long-run? Should it prove that the action of the superphosphate is more powerful, it would then be important to know what portion of the effect is due to the sulphate of lime or gypsum, of which superphosphates contain nearly half their weight; and thus we should be led to try a mixture of insoluble phosphates and gypsum, being well assured that, if they act thus mixed, they can be obtained more cheaply than in the form of superphosphate. On the other hand, it is possible that the effect of the manure may be in part due to the acid it contains acting upon the soil and promoting those changes which are known to be constantly proceeding in it, and are bringing the valuable matters from an inert into an active condition. Hence we see indications for the performance of a series of experiments in which a superphosphate is used on one plot, and the bone-ash and sulphuric acid from which it was made separately on two others.

Again, some manufacturers make a practice of adding to their superphosphate a small quantity of some salt of potash, from which they expect to obtain a favourable result. When it is recollected that it is not possible to add 2 per cent of potash to a superphosphate at a less cost than from 10s. to 15s. per ton, and then the quantity contained in the usual application—say 3 cwt.—will not exceed 7 lb. to the acre, it comes to be worth inquiry whether the farmer is justified in paying the increased price, and therefore a series of experiments, in which a superphosphate is used alone and along with a salt of potash, would be of much interest.

The effect of uniformity of distribution of manures is also a question of much importance, and here again the experimenter is led in another direction. If we consider that when 3 cwt. of a manure are used per acre, this amounts to little more than an ounce to each square yard, it cannot be doubted that the distribution must be very imperfect, unless it is assisted by the solubility of the manure, when the rain completes for us that which the hand does imperfectly.

To a certain extent, additional uniformity can be secured by mixing the manure with some other substance intended to give it bulk before application, as, for example, with twice its bulk of dry soil. It is more than probable that cases will be met with in which this mode of proceeding will be found to produce a more or less marked action.

The action of different salts upon the crop forms a wide field for inquiry, and among these nothing is more important than the action of potash. In an address given some time since before the Highland Society, I pointed out that, if the exhaustion of the soil of this country should ensue from the present system of agriculture, which, however, I do not consider likely, it will most probably depend upon the consumption of the potash of the soil. Should this be the case, the use of the salts of that alkali will obtain a greatly increased importance in the practice of agriculture. It is remarkable that at present they are found to be very uncertain in their effects. Some

years since, and chiefly at my instigation, a quantity of a salt of potash (the muriate) was put at the disposal of a number of experimenters by the Highland Society, and the results obtained were, in many cases, extremely remarkable, especially upon the potato, so much so indeed that several individuals, at their own expense, used a considerable quantity of the salt next year; but whether from the nature of the season, or to what cause it was due, it is impossible to say, but the results were completely negative. And the consequence was, that those who tried it were deterred from its further use, although it is much to be regretted that they did not extend their experiments sufficiently far to ascertain the cause of this remarkable discrepancy.

These are only a few of the points which appear to merit the attention of the agricultural experimenter, and it would be easy to point out many others. To do this, however, would be to tax your patience, and would be apt to carry me beyond the prescribed limits. I shall have done what is required on an occasion like the present, if I have brought distinctly under your notice the importance of such inquiries, and more especially the necessity for attending to all the precautions required to secure accuracy. Do not, however, let what has been said on these points deter you from making experiments, or suppose that it is difficult to attend to these precautions, for the fact is, many of them are less troublesome than might be at first sight supposed, and practical experience of the art of experimenting makes some of them almost matters of routine which are attended to without causing any consideration. Whatever labour good experiments entail, is far more than counterbalanced by their value. Let me urge, therefore, on all the importance of experimental inquiry, and more especially on the young farmer, to whom it is personally valuable, for it sharpens those powers of observation, on the proper use of which so much of the farmer's success depends, while there is nothing more important to the advancement of agriculture. But it must not be forgotten that energy and perseverance are essential to the experimenter, and that nothing is to be done without both labour and expense. I know too well the time and cost of scientific inquiries not to point them out distinctly; and it cannot be doubted, that as agriculture advances these must become greater and greater, until they exceed the means of private investigators. Elaborate experiments are extremely costly; and it is understood that the experiments of a well-known investigator have been carried on for many years at an expense exceeding £1500 per annum—a sum which, considering their extent, is really very moderate. Such an outlay will rarely be made, and the farmer ought to appreciate at its full value so liberal an expenditure. The time will no doubt come when Government will have to be applied to; and, considering its national importance, there is no reason why agriculture should not be assisted as some other departments of science now are.

DISEASES OF SHEEP FED ON TURNIPS.

By HUGH BORTHWICK, Traquair Knowes, Peebles.

(Premium, £5.)

THE diseases to which sheep are subject when fed on turnips are numerous—braxy, pleuro-pneumonia, louping-ill, and sturdy. Braxy attacks sheep of all ages fed on turnips, on all conditions of soil, and variety of turnip. Symptoms: the animal affected becomes languid and dull, uneasy and restless, separates itself from the rest of the flock, the head lowered, ears hanging, back arched, belly considerably swelled, and obstinate costiveness. As the disease advances, a clear liquid sometimes oozes from the mouth, after which death is certain. The post-mortem appearances reveal the bowels or small intestines highly inflamed, the stomach full and much disordered, a strong offensive smell. It is apparent that death has been caused by an overloaded stomach, or eating too much dirt along with the turnips, which produces inflammation of the bowels. Braxy is generally most severe in old sheep that have been fed on turnips when hoggs. In Scotland, generally, when sheep are intended to be fed, they are put on turnips in the month of October, and confined on them, with no other kind of food. The change of food, together with the often rapid filling of the stomach, causes inflammation to take place. When sheep are put on turnips for the first time, there is no danger of confining them at once. It requires about eight days before they eat them freely, so there is little danger of an overloaded stomach. Another great cause of braxy in sheep, especially on wet soil, is eating the turnips too bare before being shifted. Nothing can be more reprehensible in the management of feeding sheep, than to compel them to eat up the fragments of turnips which are rolled in mire. The eating of these is often the cause of braxy to a great extent; * another cause of braxy is when the turnips have been rendered hard by a severe frost, and the sheep suffer hunger while it lasts; on a sudden thaw ensuing, the animal having been formerly stinted, eats voraciously, and braxy is sure to follow to a certain extent.

Prevention: although braxy is the most fatal disease that sheep are subject to, it can almost be totally prevented in sheep fed on turnips by proper management. Sheep that have been previously fed on turnips, when intended to be fattened, should be put on gradually—two hours the first day, three the second, and so on for the course of a week; afterwards, if well sheltered, they ought to be closely confined on the turnips, and hay or oat straw given. A variety of food is most desirable, as it is very difficult to feed sheep

* We are not sure how far it is right to term this braxy. It seems to be a severe inflammation of the stomach, arising from the irritating effects of sand or earth, which can often be taken out in handfuls. The animals die in intense agony, with the head almost invariably turned back towards the seat of the irritating substances. Cutting the turnips, and putting them into troughs, is the only way to keep sheep healthy in the circumstances described.—ED.

on turnips alone, exposed to atmospheric changes, without a loss from disease. They ought always to be shifted to a fresh lot before the *shells*, as they are termed, are picked up, and never eaten too bare if the soil is damp. If the frost is severe, and the turnip well covered with snow, they ought to be shifted daily, always in the morning, and no more given them than can be eaten up at night. In this way the sheep feed well in snow. In the end of the year, when thick hoar frost is frequent, they ought never to be shifted in the morning till it is off the shaw. If the soil is very wet, and the weather fresh, they ought always to get as many at once as serve them for eight days, as they are not so ready to get foul as on a small enclosure. When a severe black frost sets in, and the turnips get very hard, as much hay as they can eat must be given. The following facts will show, that by attending to the rules mentioned above, braxy in sheep fed on turnips can be in a great measure prevented.

On the farm of Traquair, from seven to ten score of sheep of all ages have been fed for the last four years, from October till the middle of February. Only one case of braxy has occurred during this time; whereas, in former years, on the same farm, when the management was different, the loss was always considerable.

Of all the diseases which attack sheep, braxy, or inflammation of the bowels, is the most difficult to cure. If the animal is lean, and treatment desired, blood should be drawn freely from the jugular vein, a smart dose of castor-oil administered, with warm fomentations to the belly, which can be done by applying cloths dipped in warm water. I have cured a good many by this mode of treatment, when taken in the first stage, but when the disease was advanced, I have always failed to effect a cure.

Pleuro-Pneumonia.—It is with some diffidence that I attempt to treat on this disease, seeing the difference of opinion held by scientific men. Nevertheless, as it is a disease that attacks sheep to a greater extent than is generally supposed, I shall state a few facts which have come under my own observation.

Symptoms.—These are various, yet nevertheless characteristic in acute cases. In the first stage the animal is observed to feed less greedily for a day or so; on the second day after being noticed, the eye becomes glaring, neck outstretched and drooping, nostrils dilated, with slight coughs at intervals. The animal becomes restless, and moves about, showing no desire for food, but evidently thirsty. On the third or fourth day, death ensues. In cases where the malady is slower in its progress, the animal is observed to be not thriving, frequently coughing, the flanks lift greatly, especially when hurried in its walk. The eye is glaring, and the animal feeds sparingly, and sometimes remains in this state for months, but generally a severe purging ensues, when death is the inevitable result.

Post-mortem Appearances.—In acute cases the pleura and lungs are highly inflamed; the lungs and throat are gorged with frothy mucus; the flesh inside the chest presents a yellow appear-

ance, especially if the animal is in high condition; the brain is in general considerably congested; and the stomach and bowels are slightly affected. A good deal of fluid is found inside the chest in animals when the disease is of slow progress, indicated by frequent coughs, purging, and emaciation. The predisposition to this disease often remains latent for a considerable length of time, until some exciting cause often occurs in the management. The sudden change of food will cause its development. On the farm of Traquair, five scores of Cheviot old ewes were brought in from the hill pasture, in the month of October 1858, and put into the parks from two different hirsels, each having their distinct mark. Both were mixed together so that they might get equal feeding, which consisted of a few turnips carted daily into the grass fields. A ram was put to them in the month of October; as they were intended for keeping, they were put on full turnips in the month of February. Up to that time no disease appeared. On the fourteenth day, after being closely confined on turnips, I observed one affected with pleuro-pneumonia; on the fifteenth day other two were affected. In the course of ten days thirteen were seriously affected. In these cases many would have pronounced the disease highly contagious, from the rapidity with which it spread; however, the case was quite the contrary: of the thirteen sheep affected, all belonged to one hirsel. It is also a fact worth noting, that they were in a situation favourable for contagion, being confined in the corner of a field, in a space less than two acres. I think that there was a predisposition to the disease in the thirteen sheep affected before being put on the turnips, or else some of the sheep belonging to the other hirsel would have shared in the malady. The soil was remarkably dry, and the turnip fresh and well kept. Pleuro-pneumonia often remains latent for a considerable length of time in either cattle or sheep, and nothing is more certain in causing the disease to manifest itself than the sudden change of food. Two cows were bought from a farmer in Mid-Lothian in the month of March, both of which were in good condition, and, to all appearance, quite healthy. It was ascertained a few days after they were bought and brought home that pleuro-pneumonia had been very fatal amongst the cattle at the farm from which they were brought. Both of the cows kept quite healthy for six months, being grazed all summer on old grass along with the others. The whole herd of cows, eight in number, were put on a second crop of grass, which was richer than what they had been accustomed to. One of the bought cows was taken ill in less than a week. Mr Brydon, of Traquair, an eminent veterinary, was called, and at once pronounced the disease pleuro-pneumonia. She expired on the third day. Brydon's opinion was, that the cow had been diseased at the time she was bought, and I believe the strong pasture was the principal agent in causing the disease to develop itself. All the rest of the cattle remained quite healthy.

A question here arises, namely, Can a ewe affected with pleuro-pneumonia nurse a healthy lamb? To assist in solving this question I will relate the facts connected with the already mentioned thirteen cases among the ewes. The first four died under treatment, the fifth dropped a healthy lamb. In the course of ten days it was attacked by louping-ill, or, as it is termed, staggers, by veterinaries; on the third day it expired; another was given her, but it had always an unthrifty appearance. The sixth case lambed, and was also attacked by louping-ill in less than fourteen days, and died; another was substituted, but it shared the same fate; a third was given her, which survived, but never had a thriving appearance. The seventh case lambed, and was similarly affected; and although it survived the attack, it never fattened. All the other six cases dropped lambs quite healthy to all appearance, but were all attacked by louping-ill, and all had an unhealthy appearance when sold in the month of August. It may be said by some that the mother, being scarce of milk, caused the lambs to be unhealthy; but all had plenty of milk. It was evidently, however, of a constipating nature, which in all probability was the cause of louping-ill in the lambs. The ewes were kept on, and put on turnips in the month of October, and sold to the butcher in the beginning of February. They fed quite as well as the rest that were not affected.

Pleuro-pneumonia attacks sheep of all ages fed on turnips, but is generally most severe in old ewes of five and six years old. From the considerations just stated, it is obvious that one great cause of pleuro-pneumonia in sheep fed on turnips is the predisposition to the disease in the animal before being put on turnips, the origin of which can sometimes be traced to hereditary influence, as a proof of which the following fact may be stated:—A lot of Cheviot tups were bought at Hawick fair from an eminent breeder, to be used on Traquair hill-land. After being brought home, one of the number was observed not to make the same improvement in condition as the others; but as nothing was considered to be seriously wrong, he was put to the ewes at Martinmas, and appeared to serve them well. After being brought in from the ewes with the others, and all fed alike, still he never made the same improvement. However, pleuro-pneumonia did not manifest itself clearly till the space of eight months after he was bought, when all the symptoms became visible. To prove the hereditary influence, two tup lambs were kept, got by him, and three from another ram. The five lambs were put on turnips by themselves about the beginning of October. One of them, got by the diseased ram, died of pleuro-pneumonia in the month of December, and the other in the month of April. The other three are still alive and quite healthy, which is pretty strong evidence of hereditary influence.

Prevention: From the facts already stated it is seen that it is difficult to prevent pleuro-pneumonia in sheep fed on turnips, especially old ewes brought from pastoral districts. When sheep are suspected of being tainted with pleuro-pneumonia, they ought to

get hay and a little bruised corn along with turnips, to prevent them from scouring. I have tried to fatten sixteen sheep affected with pleuro-pneumonia, within the last three years, on this kind of food, thirteen of which fed well, the other three died.

Louping-ill, or *Staggers*, is a disease chiefly confined to young sheep, and is often very fatal in lambs from two to eight weeks old. It generally breaks out among hoggs when put upon turnips. I have seldom seen a sheep attacked with louping-ill above eighteen months old. Symptoms: In acute cases the head is elevated, and considerably twisted to one side; the eye has a glassy appearance, a peculiar twitching of the ears, a crunching of the teeth, and frothing at the mouth. As the disease advances, the animal gets quite stupid, rears or rises on its hind legs, and leaps about in a distracted state. Intervals of freedom from these symptoms are of a few hours' duration. Relapses again occur, and if not treated, the malady in these cases assumes much the same appearances as distemper in the dog. In cases where the malady is of slow progress, signs of emaciation are visible, a stiffness in the hind-quarters comes on, which often become totally paralysed. Sheep sometimes survive in this state for weeks, quite unable to move their hind-quarters; yet they feed as greedily as a healthy sheep.

Post-mortem appearances: In acute cases, the stomach is much disordered; clay or dirt is found in round balls, sometimes intermixed with wool; the small intestines are a good deal inflamed, and the brain highly so. In cases where the malady is slow in its progress, the brain is comparatively healthy; the dung hard and dry; the spine, especially about the loins or near the kidneys, is much diseased, and presents a darkish appearance. Very often tumours are found near the spine, as large as a marble, which sometimes form, break, and this generally relieves the animal a good deal, but seldom effects a cure. In these cases the animal is very tenacious of life, and presents a distressing appearance, pining away to skin and bone, before death puts an end to its suffering. Causes: The primary cause of louping-ill, or staggers, in a great many cases, can be traced to the soil upon which they are nursed when lambs. On the hill-land of Traquair Knowes, lambs are very subject to louping-ill. Those that were partially affected when lambs, but got apparently better, are always the first to fall victims to the disease when put upon turnips. It is impossible to detect anything wrong with them at the time they are put on turnips. Prevention: Cases of louping will occur on every condition of soil and variety of turnip, if the hoggs have been bred on pasture subject to its attacks, as there is often a predisposition to the disease in the animal before being put on the turnips. The only preventive is keeping the turnips clean, with a variety of food—hay, if it can be had—and shelter at night, if the weather is stormy. Hoggs had better be driven a mile every night to obtain shelter, than allow them to lie all night exposed to wind and rain. On the farm of Traquair

Knowes, which is naturally very subject to louping-ill, the cutting of turnips has been tried with the hoggs fed on turnips for the last two years. It has succeeded well even in the lot of the ten score of hoggs formerly mentioned, the disease having broken out to a severe extent, threatening to exterminate the whole flock. Not a single case occurred after the turnip was kept clean, and hay given.

Sturdy attacks only young sheep, chiefly from nine to eighteen months old. The symptoms are various, but are easily observed. The animal in its first stage appears dull, often lagging behind the rest of the flock. As the disease advances, the head is uplifted, the eyes prominent, and instead of running straight forward, the animal wheels round in a circle. There is always partial, and often total, blindness. The animal often lives for months after the first symptoms are recognised. In opening the head a bag of water is found in the posterior lobe of the brain, always on the same side as that to which the animal turns. It is sometimes on the surface, and at other times below the brain. In cases of sturdy preceded by louping-ill, the symptoms are not always so easily known. The head is sometimes hanging, at others elevated, the eyes prominent, never wheels, but runs straight forward, staggering, and often falling over. On opening the head the bag of water presents all the appearances of the former case, but is always lodged in the cerebellum, or near the medula oblongata. These cases are termed *thortorill* by some writers, from the staggering gait of the animal. Causes: Great difference of opinion regarding the cause of sturdy exists: some writers ascribe it to dogs; others to bad nursing; and a good many maintain that it is hereditary. This latter opinion is condemned by some veterinary surgeons; and it is a fact which is often presented to practical stock-keepers, that hereditary influence has a tendency in aggravating the disease.

A farmer in Peeblesshire bought of two adjacent farmers thirteen score of lambs in the month of August—seven score from the one and six from the other—all at the same price. They were top lambs; those from each farm were separately marked for distinguishing them. They were afterwards all grazed together, and put on turnips in the month of November. Thirty of the hoggs belonging to the one farm fell victims to sturdy before the month of April, whereas only two belonging to the other lot were affected.* The hoggs were all fed in one lot, consequently they all shared alike. It is a fact worth mentioning, that sturdy had been very fatal for several years amongst the stock where the thirty hoggs affected were bred. Scanty nursing is a great cause in producing sturdy. On the farm of Traquair Knowes, for some years all the lambs were kept, both tops and "palleys." The latter fell victims to the

* We once bought in spring some Cheviot hoggs that were second lambs in the previous August at Melrose. There were no cases of sturdy in this lot, neither in winter nor spring. The tops of the same stock were fed on a neighbouring exposed farm on turnips during the winter, and nearly 20 per cent were affected with sturdy. The seconds had the run of some stubble fields, and were well sheltered. Everything that tends to impair the health of the animal predisposes it for sturdy.—ED.

disease to a great extent during the winter when fed on turnips; whereas the stronger, that had been better nursed, resisted its attack much better.* Sturdy prevails to the far greatest extent on wet unsheltered soil; where the turnips cannot be eaten clean, tends to bring on both sturdy and louping-ill. If the animal is affected with the latter, and is not watched and treated, sturdy is certain to follow. Prevention: On the farm of Traquair Knowes, for several years, when the hoggs were kept on turnips alone, the cases of sturdy were great. One year especially, there were as many as five to the score affected; whereas, for the last two years, when hay and rape-cake were given along with the turnips, and shelter attended to, the cases of sturdy have not been above one to the hundred. During the last two years the lambs were no better nursed than in former years, when sturdy prevailed to such an extent. For the prevention of sturdy, Mr Gamgee advises to diminish the number of dogs. On the Earl of Traquair's home-farm, the hoggs kept yearly are about a score, and the dogs never below ten, which is a dog for every two hoggs. The dogs are daily aired on the sheep pasture, and for the last seven years only one case of sturdy has occurred, which I treated and cured; whereas, on the farm contiguous, Traquair Knowes, where only two shepherd dogs are kept, sturdy has sometimes prevailed, as already stated, to the extent of five hoggs to the score. The great difference in the number of cases on the two farms can be easily accounted for. Upon the Earl's home-farm the lambs are well nursed and sheltered when young, which cannot be accomplished in lambs bred on Minchmuir, being the hill-land of Traquair Knowes, noted for its barren and bleak mountain sides; and when they are put upon turnips, shelter cannot be obtained like that of the Earl's home-farm, surrounded as it is with plantations. And in this lies the whole secret of prevention: first, to get the lambs well nursed; when that cannot be done, to give extra feeding on turnips, and have the turnips as clean as possible, and let the hoggs be well sheltered.†

Treatment.—In cases commonly called sturdy—that is, where the animal wheels round in a circle, and where the bag of water is found in the posterior lobe—treatment is often very successful. I have cured as many as nine out of ten. The best instruments are those made by Hilliards, Edinburgh. Before operating, the animal's legs ought to be bound, and laid on a table, or otherwise elevated about two feet from the ground. Great care ought to be taken to keep the head steady: the skull must be pierced on the same side as the animal wheels to, close behind the horn, and the pipe allowed to remain in the skull till the

* The treatment when lambs might have some effect in producing these results; weak stocks are no doubt more liable to the disease.—Ed.

† Mr Gamgee, we imagine, maintains that a weakened or reduced constitution is a necessary condition of the insects which form the hydatid in the brain of the sheep lodging there. Is it denied that the tape-worm in dogs and the sturdy insects are not different forms of the same animal? In the mean time such a supposition as this saves us from falling back on the old theory of spontaneous generation.—Ed.

water ceases to run; afterwards the sucker ought to be applied. If the bag is near the surface, it is easily extracted after being emptied of its contents, and which is easily ascertained from the length the tube requires to be inserted before the water flows. If the bag is below the brain, the sucker ought only to be applied slightly to draw off any water that may remain, as it is impossible to extract the bag in these cases without injuring the brain, and causing death. An opinion is held by some that if the bag containing the insects or animalcules is not extracted, a cure cannot be effected. I have often seen, in operating on sturdy, that cures are effected equally as well when the water is extracted, and the bag not got out of the brain, as when the contrary is the case. Whenever the animal is observed to turn round, it ought to be operated on immediately. It is highly reprehensible to wait till the skull becomes soft and yields to the touch. The softness of the skull is no criterion for the operator: the side the animal turns to is the only sure guide. Besides, when the animal is operated on, as soon as the distinctive symptoms are visible, a smaller vacuity is left in the brain, and the animal is not reduced by emaciation, as when it is allowed to go till the skull becomes soft. In all cases the animal ought to be sheltered either from excessive heat or cold, and the wound in the head bound up after the operation. In cases of sturdy where the bag of water is lodged in the cerebellum or near the medula oblongata, I have always failed to effect a permanent cure. Still these cases are not hopeless, for I know a good many are cured by experienced operators; but having never seen it done, I cannot say positively how the operation is conducted.

There is a disease peculiar to ewes in lamb fed on turnips, especially if in high condition, when turned off to the grass or driven any distance, and which may be termed *founder*. The animal affected loses power of its legs, and is seldom treated with success, and death often ensues in a few hours. Although a fatal disease, it can be prevented by putting the ewes gradually off the turnips on to the grass—one hour the first day, two the second, and so on for the course of ten days. If the ewes are intended to be driven any distance, such as to a market, hay ought to be given along with the turnips for the course of fourteen days before starting.

Sheep, especially hoggs, are often attacked with purging when put on turnips in the end of the year. If it continue only for a few days, it ought never to be checked by medicine; hay, a few Scotch fir branches, or a run over some heather two hours in the day, will generally have the desired effect; but if the purging still continues, and the animal becomes emaciated, there is reason to suspect the lungs are affected. In this case the animal ought to be removed from the rest, and a little bruised corn and hay given along with the turnips, which will often have the desired effect, after baffling the most stringent medicines.

NOTE BY EDITOR.—*From want of space, the continuation of Mr Innes's paper on Remarkable Trees has been deferred till January.*

ON QUARTER-ILL, OR BLACK-LEG.

By JAMES M'GILLIVRAY, V.S., Rayne.

[Premium—The Gold Medal.]

IT is many years since a well-known scientific gentleman said, "diseases are more easily prevented than cured, and the first step towards their prevention is the discovery of their causes." The present time is remarkable for the precision with which scientific subjects, more especially those connected with the practice of medicine, are discussed; nothing, however gigantic or minute, can escape the mental acumen, the recorded and accumulating experience, and the searching investigation now made to bear upon this most important of all physical subjects; not even "the progressive variations" of disease can elude the sifting and persevering industry that rarely misses the track, but with steady aim pursues them "close through every lane of life."

In responding to the call of "*The Highland and Agricultural Society of Scotland*" *for reports on Black-Leg*, the writer of the following pages trusts that they will not be found unworthy of patient investigation. No doubt the disease, subsequently discussed, is not now so common as it once was, still it now and again appears amongst stock on well-regulated farms. Last month a farmer in my neighbourhood lost two good stirks in one day by black-leg; this gentleman *never setons* nor *gives oil-cake.* During the present month, October, a farmer, in a rich district, and occupying a good and large farm, wrote me to attend and seton his stirks, "*for*," says he, "*they are dying daily.*" On attending at the farm I found that three beasts had died of quarter-ill within a few days. The nature, cause, prevention, and treatment of this disease are, therefore, far from being unimportant subjects for study or discussion.

SECTION I.—PROXIMATE SYMPTOMS OF BLACK-LEG, OR QUARTER-ILL.

The first symptoms that attract attention to animals affected with this disease are a vague and listless expression about the face, eyes dull, ears heavy and dangling, pulse irregular—sometimes not to be felt, at other times as high as 70, 80, or nearly 100 per minute; mouth dry and hot; at times the membrane of the eyelids very red, but not always so; often lameness in one of the limbs; enlargement about the spine, quarters, brisket, neck, or head; unwillingness to be moved about, whether down or up; no food taken; rumination gone; bowels at first slightly constipated, and getting more so as the disease progresses; urine scanty and high-coloured; and, finally, on pressing the enlarged places the animal

evinces little pain, but, if the disease has existed for some time, there is a crepitating crackling feel under the skin, well known to every one who has seen the disease. These are the most prominent symptoms when the animal is affected *externally*. When the disease attacks the animal *internally*, many of the above symptoms are wanting; the animal may not be lame, but is extremely weak, unwilling to turn round, if down will not rise, and if up will not readily lie down; if left alone, stands stupidly in one place; there is obstinate constipation, no urine, breathing hurried and painful, legs and ears icy cold, and shows a painful feeling if pinched between the ribs, or about the flank. If the majority of these symptoms are present, there is little difficulty in determining the disease and the result. Most cases of quarter-ill occur in young animals; very few are affected with it after they are eighteen months old; still I have met with it in stots and heifers feeding. In such cases, as soon as the disease was certain, the owners had them slaughtered. I have also met with this disease in milch cows; and in such cases there is a greater chance of treatment becoming available, as the disease takes a much longer time to run its course, and the constitution is not so much depressed at first. If a little blood is taken from an animal suffering from an attack of black-leg or quarter-ill, it is black, thin, does not redden on exposure to the air, and does not readily coagulate: this last sympton will depend partly on the intensity of the attack, or the length of time it may have existed. In all cases, without exception, the blood is abnormal, and shows a remarkable deficiency of fibrin.

No doubt there are symptoms more remote than those now recorded, but such symptons are very obscure, and I am not aware of a single case of black-leg having been detected until a local determination—congestion—had been effected in some part of the animal, and its presence, and that of the disease, indicated by the actions or movements of the beast. The great difficulty is in detecting the presence of the disease sufficiently early to allow the knowledge of its existence to be of any practical benefit.

It will be obvious to every one who has acquired a sufficient degree of scientific knowledge of the structure, functions, and habits of animals, &c., that the deterioration of the blood is more or less of a gradual process. In proof of this point, and in connection with the subject under investigation, I may mention a circumstance that just occurs to my mind. I was employed to take blood from nine one-year-olds; six of these had blood apparently of good quality, the blood of the other three was uncommonly black, thin, and bad-looking; so much so was this the case, that the people who were rendering assistance made observations on its bad appearance. Well, one of the three had blood blacker than that of the other two: this one died of black-leg within ten days, and another of the three died of quarter-ill or

black-leg within one month from the time they were bled. Originally there were eleven stirks, but two died of the above disease immediately before the lot were bled. Thus four stirks were lost from same cause within two months; the remaining seven were put early to grass, and all lived. The owner had no faith in setoning then, but setons all now, and no deaths.

AUTOPSY.—*Appearances presented by the carcases of animals that died of Black-Leg.* The principal attack of this disease is generally confined to a circumscribed spot. If it show externally in a puffy and swollen state of any organ, or any part of an organ, on cutting open such place the whole underlying sub-cutaneous cellular tissues are found gorged with black-looking stuff, from which oozes out a large amount of serum, mixed with colouring matter and water from the blood; some albumen is mixed up, still slightly characteristic, but in a decomposing state; there is a manifest want of the ordinary cohesive properties of blood, even in all the blood-vessels throughout the carcass; in arteries and veins the blood is thin, black, watery, and shows no coagulative tendency whatever, does not redden on exposure to atmospheric air, does not coagulate at all, even if kept for days, and passes rapidly into decomposition. This local affection is peculiar to, and distinctive of, black-leg, and it may, and often does, occur internally; it is found about the kidneys, the spine, in the abdomen, in the chest, and about the head and neck, &c. In every place it presents the same appearance, and is distinguishable by the same physical characteristics. I have carefully examined, under the microscope, with powers varying from 200 to 410 diameters, the blood from a beast that died of black-leg. Under these circumstances I have compared it with blood taken from a healthy beast, and the difference was very obvious. The blood from the diseased animal exhibited a disintegrated mass, without organisation, showing no distinct corpuscles, red or white—something indeed like ruptured fragmentary cell-walls, but nothing definite; while, with the same microscopic powers, the normal blood showed its organisation at a glance, the red and white corpuscles clear and distinct.

I have examined many animals differently affected, as to locality, and I find the disease presents the same features wherever situated; and, if left to itself, death always ensues in black-leg by asthenia; still, in most cases, the part or organ directly affected by it is circumscribed, local, and small. Often one is puzzled how to account for the suddenness of death, the visible causes are apparently so very trifling. However, on making a careful *post mortem* examination, and taking fully into consideration the state of the affected place, and its physical consequences, while the animal was still alive, the cause of sudden death becomes evident. Under the congestive action which had at one period existed, the capillary vessels had given way,

and permitted the escape of their contents; fibrinless, disintegrated, and watery blood passed into the tissues; this diseased and disorganised fluid had forced itself, or been forced into, and permeated the soft parts immediately surrounding, and connected with, the affected parts. Whether or not any physical or structural change had taken place in the capillary organisation, by which the escape of the fibrinless and disorganised blood was facilitated, I have never been able to determine. Most likely there is such a change; but in order to have an opportunity of making the proper and conclusive examinations on this point, the affected animal would require to be destroyed in the early stages of the disease. The truth is, before the parts are subjected to examination there is so much disintegration of all the tissues about the affected part, and they are so closely amalgamated with the putrefying blood, with which their every crevice is filled, that the whole presents the appearance of one homogenous mass; and it is only with considerable care, and no little difficulty, that a fair sample of the so-called blood can be separated for inspection. Partly in consequence of the high temperature that existed in the early stages of the disease, the blood passes rapidly into decomposition; and, before the disease has been long in existence, much of it is essentially dead, giving off gas, as all decomposing animal matters do; the crepitating feeling under the skin is due to this. Around the outer edges of the diseased spot the functions of life have been partially performed, and a certain amount of this dead and decomposing animal matter has been carried off by the still acting absorbents, and by them has been deposited throughout the animal system, and thereby acting as a poisonous agent. The cause here referred to may seem inadequate to the effect; but the effect of such an agency depends more upon the previously existing state of the blood, as to its susceptibility for being acted upon by the peculiar influence of such agents, than upon the quantity of dead matter that may be introduced into the circulation. The peculiar state of the blood has been already referred to; and, taking them together, I am satisfied they are the principal means of determining, and in a considerable degree accelerating, the period of death.

SECTION II.—THE NATURE OF BLACK-LEG OR QUARTER-ILL.

Should I be able to elucidate the true nature of quarter-ill, then the task of pointing out the means of prevention or cure will be comparatively an easy one. And it is true that some diseases may, in their very nature, so affect the animal system before they run their unavoidable course, and produce such ravages in the animal system, that to raise up the body into a comparatively healthy state may be impossible. In such a case, to prevent an attack of the disease, or to mitigate its severity so as to render its occurrence comparatively harmless, is the best policy that can be pursued. Dr

Jenner's inimitable application of vaccination as a preventive of small-pox, is an obvious example of what I mean.

For *many years* I have made quarter-ill, or black-leg, my special study, and at my suggestion hundreds of experiments have been made in connection with its prevention. The results will be faithfully given as we go on, accompanied by hundreds more in the same direction. Without entering on the question as to whether the disease has its origin in inflammatory action or not, I shall at once state, that all investigations that have been truthfully conducted, point directly to the conclusion that the blood of all animals affected with quarter-ill is deficient in the most important element, fibrin. The red corpuscules are in a disintegrated state, and this condition of the blood is not restricted to this particular disease. The state of a cow's blood suffering under the disease known as *red* or *black water*, is precisely analogous; and in the human subject the congestive form of typhus presents exactly the same symptoms of attack, runs the same course, and is sometimes as rapidly fatal. Of this last affection Dr Fordyce says, that when the attack is fatal, it sometimes kills in five minutes, sometimes it requires half an hour, seldom longer than that time. Should the patient linger a little longer, we find it recorded that *petechiæ*, and sometimes vibices, appear on the surface, the pulse intermits and sinks, the extremities grow cold, and death ensues. The disease I am now studying is clearly one of a decidedly typhoid character. It is congestive typhus, with a local determination; the thin semi-disorganised blood exuding through the coats of the bloodvessels, and becoming lodged in the cellular tissues in the neighbourhood of the congestion, whether subcutaneous, inter-muscular, or internal.

SECTION III.—CAUSES OF QUARTER-ILL OR BLACK-LEG.

All physiologists who have directed their attention to the subject, have agreed that the deficiency of fibrin, and the otherwise vitiated state of the blood, are the principal proximate causes of quarter-ill. In endeavouring to elucidate the *remote* causes of this malady, let us first of all inquire, What is the source of fibrin, and the other constituents of healthy blood in the Graminivora? and, secondly, What part does the fibrin, &c., perform in the animal economy?

Firstly, The digestive apparatus in ruminants is not very simple. Their food consists of vegetable products, and much of these contain *very little nitrogen.* It is from these vegetable compounds, however, that their blood, and, consequently, all the various organs composing their bodies, are abstracted. Liebig says:—"Chemical researches have shown that all such parts of vegetables as can afford nourishment to animals contain certain constituents which are rich in *Nitrogen;*" and the most ordinary experience proves, that animals require for their support and nutrition less of these

parts of plants in proportion as they abound in nitrogenous constituents. These important products of vegetation are especially abundant in the seeds of the different kinds of grain, and of pease, beans, &c., in the roots and the juices of what we commonly call vegetables. The nitrogenous substances referred to are generally styled the plastic elements of nutrition, and are vegetable fibrin, vegetable albumen, and vegetable casein. Mülder says, that, in both plants and animals, a substance is found which is produced within the former, and is imparted to the latter through their food; it is contained in all parts of plants, in their roots, stems, fruits, leaves, &c., and in all their saps; and it forms different compounds with sulphur and phosphorus, or with both. Thus the vegetable albumen, fibrin, casein, &c., are the basis of the animal system, and enter into the various combinations therein produced. These considerations induced Mülder to give to the product of vegetable albumen, &c., the name of Protein. The blood, or the constituents of the blood, are consequently compounds of this protein, with variable proportions of inorganic substances; and it has been truly said that without it no life appears possible on our planet, —through its means the chief phenomena of life are produced. In addition to the above, however, we know that another class of substances is required in the animal economy, such as starch, gum, sugar, &c.; these are convertible in the animal system, and are necessary for carrying on the air-breathing process, and for the accumulation of fat, this fat being again convertible to other purposes.

Secondly, What part does the fibrin perform in the animal economy? Fibrin being that substance which exhibits more vital properties than any of the other fluid components of the blood—so much so, that, if separated from the other constituents of the blood it is capable alone of assuming the condition of an organised tissue, —it was natural to suppose that it was the pabulum from which materials were drawn for the growth and development of the animal body. This opinion was at one time held and promulgated by Dr Carpenter; but it has been shown that, so far from there being any evidence of the identity of the fibrin of the blood and the substance of muscle (flesh), the evidence goes entirely in the opposite direction. Further, it has been clearly demonstrated, from both structural and chemical indications, that fibrin is rather in a transitionary state towards the *fibro-gelatinous textures* than towards the cellulo-albuminous class; because the fibrous network which is formed by its coagulation bears a stronger resemblance to the white fibrous tissue than to any other texture of the body; whilst the points in which the chemical properties of fibrin differ from those of albumen are such as manifest a relationship to gelatine.

Now, there is a large class of tissues in the animal structure

named gelatinous, from the large quantity of gelatine that may be extracted from them; the principal of these are the skin, hair, hoofs, cartilage, serous membranes, and the soft part of bones, &c. The organised fabric of animals contains a very large quantity of gelatine; in fact all our knowledge of the development or growth of the gelatinous tissues combines in leading us to regard them as secondary products, which take their rise in fibrin, and can only be generated by the metamorphosis of protein compounds. We may therefore regard it (fibrin) as the special *basis* of the many gelatinous tissues which occupy so important a position in the animal economy. Most chemical physiologists have agreed that the substances forming gelatinous tissues cannot, under any circumstance, be retransformed within the animal body into any kind of nutritive material, excepting to gelatinous tissues again. It is easy to understand, then, how the blood in young animals may become destitute of fibrin, for the gelatinous tissues in young animals form a far larger proportion of the whole body than they do in full grown animals. A constant demand is, in them, made on the fibrin of the blood to meet the requirement of material for the fast growing gelatinous tissues contained in the cartilage, the soft parts of bones, the ligaments, the serous membranes, the skin, hair, hoofs, &c. Once the fibrin is transformed or converted into these gelatinous tissues, it cannot be reconverted into blood, or enter into the composition of any other part of the living body.

It is a singular fact connected with quarter-ill or black-leg, that young animals apparently, under almost every circumstance or condition, have been affected by it—some of them lean, and daily getting more lean, others of them fat and daily getting fatter. This anomaly, however, may be easily explained: the daily food supplied to the former, if sufficient in quantity, has been sadly deficient in quality; it has been destitute of the elements of protein, also of those necessary to produce fat. In the latter case, where the animals have been in good condition, thriving as well as one could wish, the food has been rich in matters adapted for the production of fat, starch, oil, &c., but deficient in the plastic or nitrogenous elements of nutrition. The elements of fat have been furnished in the food, the animal has grown well, the framework has been raised; but in furnishing to the strong, large, and fine frame the fibrin, &c., necessary to produce the gelatinous tissues, the amount of fibrin in the blood has been reduced much below the normal standard. Some exciting cause passes over the animal, and he becomes a victim of this fatal disease.

The most casual observer must be cognisant of the fact, that some breeds of cattle are more liable to be affected with quarter-ill or black-leg than others. The old breeds common to Scotland many years ago, were the most subject to its attacks; and, where there still remains a few of them, other circumstances being alike,

they are even now far more liable than the fine short-horn and short-horn crosses now to be met with in every locality. Generally the breeds that showed the greatest liability to an attack of this disease (I never heard of an animal having it *twice*) were *thick-skinned*, strong-horned, shaggy-haired, heavy-boned, clumsy-looking brutes: and, although there were exceptions, they were not commonly supplied with properly nourishing food; and the fact that they were heavy in the offal, the skin, hair, bones, &c., —being far heavier than in the improved breeds—I say, this fact alone made them far more liable to attacks of quarter-ill or black-leg, inasmuch as the gelatinous tissues, being more extensive, made a greater demand on the fibrin of the blood, reducing it below the proper standard, and thus predisposing the animal to diseases of a typhoid character. Moreover, when the breeds now referred to were common, the accommodation for cattle was not nearly so comfortable as it is now. Byres were either low, dirty, and ill-ventilated cots, or they were open in many places to all the winds of the heavens. I recollect perfectly what a work it was to stop up and keep out the snow when the "*drifty*" day came; many of the young animals were half-starved for meat and shelter, and no wonder they died of quarter-ill or black-leg. I find that improvement in comfort and stock has had a most beneficial effect in warding off this very fatal disease. The breeds now valued are well housed, comfortably kept, regularly supplied with food, and that food of good quality and a sufficient supply,—on all well-regulated farms the cattleman being considered the most important man amongst the officials, the consequence is that black-leg has become very restricted. Still, whether it be anything about the farm-steading, such as exposure to certain unhealthy currents, the mode of management, the breeds, or anything raised in the crops, black-leg does now and again appear, and the sequel of this report will show that there is more of it in this country than would at first sight appear.

SECTION IV.—PREVENTION OF BLACK-LEG OR QUARTER-ILL.

Possibly without any true notion of the manner in which the animal system became affected by the operation, setoning the dewlap of stirks, as a preventive of black-leg, has been practised, on a very limited scale, in Scotland for at least twenty-five or thirty years back. For a great part of twenty years I have practised it myself, and have never lost sight of its effects as a preventive. I recollect perfectly of the first lot of cattle I setoned; it was in the autumn—three one-year-olds and two two-year-olds had died, on the farm, of black-leg, and all within a few days. Another person and I proposed to the overseer of the farm that the remaining stock of the same age should be setoned in the dewlap as a pre-

ventive. And, as a commencement at that farm, I then setoned thirty-three cattle; most of them had been sucking calves, and had never been bound in a house, and consequently the job was a keen one: no more of the cattle died, however; and I do not recollect of hearing of another beast being attacked at that farm with black-leg after the setoning was begun and carried on.

The principles on which setoning for the prevention of this disease is adopted may here be explained; it has already been pointed out that the proximate cause of the disease is the deficiency of fibrin in the blood—the disease itself being congestive malignant typhus. In all typhoid diseases the fibrin is deficient in the blood, and there is very little arterial action; but it is found, by the experience of all medical men, that if an inflammatory action can be set up in the system, even should it be circumscribed and local, the amount of fibrin in the blood is immediately increased. Dr Carpenter says, "in putrid or malignant fevers"—*and such is black-leg*—"there appears to be a very marked diminution of fibrin, and also in the other solid constituents of the blood; and in its advanced stages the blood may entirely lose its power of coagulation"—*in such a state I have found the blood in black-leg*—"and in a case of typhus abdominalis in which the blood was analysed the fibrin was altogether deficient." Now, the quickest, the safest, and the best plan for raising and maintaining a merely local inflammatory action in cattle, and thus keeping up a proper amount of fibrin in the blood, is by inserting a seton in the dewlap. The part of the animal called the dewlap is that portion of comparatively loose skin where the lower part of the neck terminates in the brisket between the forelegs. The manner in which I operate is this: I have a seton-needle five inches long, very sharp at one end and blunt at the other, in which there is a large eye; I take the strongest and broadest tape-wick to be got. From twelve to fourteen inches of this wick is required for each beast; about three inches in the middle of this setoning string is smeared with a mixture of equal parts of digestive and blister ointment; this smeared string is now inserted into the eye of the setoning-needle. I then pull down the skin for about three inches, almost between the fore-legs in front, thrust through the needle, leave the setoning-string in the opening—fastening the two ends of it securely, and the operation is completed. To have an increased benefit from the seton it should now and again be turned, and a little fresh ointment put upon it to excite and keep up a strong but merely local inflammatory action. The mere presence of the seton, however, acting as a foreign body, will serve to keep up the necessary irritation and slight suppuration, and so long as this is done so long will the consequent inflammatory action maintain the proper amount of fibrin in the blood.

By men whose minds were unprejudiced and open to conviction,

setoning the dewlap of their young stock as a preventive of black-leg, has been fairly tried, and with the best results. However, the doctrine of prevention is a very dark and uncertain one, and requires strong proof and a broad basis whereon to establish a principle founded on it. Although, from extensive and prolonged proof, I am, myself, perfectly satisfied of its efficacy, yet I was anxious to test the principle by an appeal to the experience of stockmasters in general. During the present year I had above one hundred copies of the enclosed circular* sent to farmers and others scattered over a portion of the kingdom one hundred miles long by forty miles broad; also to the Orkneys, &c. I addressed to all the same circular, without making any special observation to any one. Many of the gentlemen so addressed I have never seen, merely had their names and address from the public newspapers. Enclosed along with each circular I sent an envelope stamped and addressed to myself. The answers are most satisfactory; they are from men of every grade in agricultural society—proprietors, land-stewards, and farmers; each and all freely give their experience on this important subject. From these it will be seen that setoning the dewlap is the principal means adopted for the prevention of quarter-ill or black-leg; still other appliances are useful in keeping the animal in a healthy state—these will be, and have already been, referred to. I shall now avail myself of this proof, by subjoining a few of the principal notes received in answer to my circulars, giving the exact words of the writers, and the initials of their names and farms or residences—viz.:

1. P. G., H., says: "In answer to your inquiry, three years ago I got ten calves setoned, and all came through safe; next year I neglected setoning, and *six* of them died of quarter-ill; last year I had ten setoned, and all came through: previous to my adoption of setoning, I was in the way of losing one, two, or three yearly. I know of nothing equal to the seton."

**February* 16, 1860.

SIR,—Wishing to be in possession of reliable Statistics on the effect of Setoning the Dew-lap as a *preventive* of Quarter-Ill in young Stock, I respectfully request your answers to these few questions:—

I. State the gross number of Calves you have had Setoned yearly?
II. For how many years have you practised Setoning?
III. How many of those Setoned have died of Quarter-Ill?
IV. Previous to your adopting the Seton, were your young Stock subject to Quarter-Ill?
V. Do you know of any other means of prevention equal to, or preferable to, the Seton?

You will oblige me very much if you procure information on the above points from any of your neighbours, and enclose, along with this note, to, your obedient servant.

2. J. L., M., writes: "For five years I setoned nine calves yearly, and none died; often I lost before. Three calves died of quarter-ill the year before I commenced setoning."

3. J. S., C., writes: "Have much pleasure in answering your queries. For the last six years I have setoned from sixteen to twenty beasts yearly, out of which there has not been a single death from quarter-ill. Three years previous to adopting the seton, out of eight year-olds we lost *three* of quarter-ill; and yearly before, from time to time, a beast."

4. A. L., B. R., says: "For the past twenty years I have setoned between fifty and sixty calves yearly; very few of these have died, *if any*. My stock was very subject to quarter-ill, previous to my adopting the seton. The use of a moderate quantity of linseed-cake has been found to be very beneficial to young stock after being housed, continuing this until grass next season."

5. W. S., F., says: "For five years I have setoned eight calves yearly; two of these died of quarter-ill. Previous to adopting the seton, nearly the one-half of the number died yearly."

6. R. M'W., C., says: "I have setoned nine calves yearly for fifteen years, and of these I have lost *one* in quarter-ill. I lost repeatedly before. In 1847, one was affected and died. I bled the rest as a preventive, and in five days *one* more died in quarter-ill; I setoned the remainder, and had no more trouble."

7. Mr W., D., writes: "I have setoned for upwards of sixteenth years from thirty to forty of my own stock yearly. Three of the whole have died. Previous to adopting the seton they died of quarter-ill occasionally; but since, I have taken more trouble in feeding, and this, I think, has much to do with prevention. I know of no plan preferable to the seton: the seton is the most simple. Blistering on the loins with *tar*, and bleeding, is said to be a preventive.

8. A. C., B., writes: "I have setoned my young cattle for eight years, from twelve to fourteen yearly; two of these have died, but it was doubtful if quarter-ill was the cause of death. Previous to setoning, I often lost three or four in one year from quarter-ill. I never tried any other preventive."

9. D. M., E., writes: "Previous to the late proprietor letting his farms, the young stock, which averaged about thirty, were all setoned yearly, for about twenty-four years, the present cattleman being here all the time, and longer, say for thirty years past; and during the time of setoning, does not recollect of a single death from quarter-ill."

10. G. H., L., writes: "I have setoned for four or five years from seven to nine yearly; none of these have died. Previous to setoning, scarcely a year passed but some of them died. I have tried different things to prevent it, but I prefer the seton."

11. G. A., C., writes: "I have setoned eight years, six calves

yearly, and none of those have died. I was very much distressed with quarter-ill before. I know of nothing equal as a preventive."

12. W. C., C., writes: Have setoned my calves for sixteen years at least; averaging six calves yearly, *one* died in quarter-ill the day after being setoned; no more have died; my stock were exceedingly subject to quarter-ill before."

13. N. O., P., writes: "Setoned ten calves yearly for eleven years; none of these died, but before, some seasons, I lost in quarter-ill."

14. A. S., G., writes: "For the last eight years I have setoned twelve calves yearly; two of those setoned have died of quarter-ill; previous to setoning I did lose some calves, but not to a great extent; what I approve of is a selection of food, so as to keep the bowels regular, and the blood in a healthy state—linseed or oil-cake; I have used this for four years along with the seton, and have lost none since."

15. A. M., S.: "I had twelve calves setoned yearly for ten years; of these two have died of quarter-ill. Previous to setoning, my beasts were very subject to quarter-ill."

16. G. M., W., writes: "Have setoned from eight to ten calves yearly, for about four years back; two of these have died, but before I setoned, my stock was very subject to it. I know of no other plan equal to the seton as a preventive."

17. J. P., landsteward, C., writes: "I am in receipt of yours regarding setoning calves. I shall give the information with great pleasure: there are always twenty calves on the farm here, and since you setoned them first, eight years ago, I have done it always, and lost none; before setoning, scarcely a year passed without deaths; the year before you commenced it here there were four died in quarter-ill. I know of nothing equal to the seton as a preventive; please let me know the ointment you approve of for making the setons."

18. J. L., H., writes: "I have setoned my young beasts for four years back, from seven to eight yearly, and of those setoned none have died. I was terribly annoyed with quarter-ill before I setoned. I have lost four in one season.

19. J. D., B., writes: "I have practised setoning for about twelve years. I have done from thirty to forty for myself and neighbours yearly, and during that time I have known only three to have died of quarter-ill; last year I neglected to seton my own, and one of them died; three years ago I neglected it, and one died; for my part, I know of nothing equal to the seton as a preventive; before setoning, I scarcely passed a year without losing one or two."

20. G. H., M., writes: "For eight years I have setoned yearly sixteen calves; two of these have died; many of my young beasts died of quarter-ill before I commenced to seton."

21. Mr C., L., writes: "Had for several years lost two or three

yearly from quarter-ill, but have for the last five or six years setoned my young stock, and no symptoms of the disease have appeared since that time; my young stock, bred by myself, is generally about fifteen."

22. R. A., H., writes: "I have practised setoning for eight years, and have setoned sixteen calves yearly; of these I have lost one or two of quarter-ill. I approve of 1 lb. of oil-cake per day to each beast, as there have none died since the oil-cake has been used by me; previous to using the seton my stock were very subject to quarter-ill."

23. J. M., J., writes: "Have setoned for nine or ten years from eight to twelve yearly; and none of those setoned have died. To a very great extent I was subject to quarter-ill in my stock before setoning."

24. J. L., B., writes: "I have practised setoning my stirks for nearly twenty years, and from fifteen to eighteen yearly. Of these few, *if any*, have died of quarter-ill. Occasionally some died of quarter-ill before I commenced to seton."

25. J. D. C., A., writes: "I have setoned for the last eight years eight to ten yearly; none of these have died; previous to setoning, mine were very bad for dying in quarter-ill."

26. Widow A., J., "Had *seven calves* died of quarter-ill in 1857; was induced to try the seton ever since, and none have died."

27. W. P., J., writes: "I have setoned nine calves yearly for seven years, and none of those have died. Generally, two or three yearly died before I commenced to seton."

28. J. D., C., writes: "We have setoned yearly, for at least eight years, nine calves; one of these always ate out the seton and died of quarter-ill; generally, we lost one or two yearly before; the seton is the only preventive I know of."

29. A. P., M., writes: "I have setoned for four or five years fifteen calves yearly; none of these have died of quarter-ill: previous to setoning, I lost one, two, and three calves *yearly*. I think when I gave oil-cake I had no quarter-ill."

30. G. B., Y., writes: "I have setoned twenty-six calves yearly for the last six or seven years; only lost one of these, and that one only last week; before setoning I was very subject to quarter-ill, generally losing four or five in a year by it. I know of no other preventive than setoning."

31. J. M., Forgue, writes: "Have setoned for fifteen years six calves yearly; only one of these died of quarter-ill, and that one ate out the seton."

I shall now add a few extracts from the answers to my circular, that refer more particularly to the value of oil-cake as preventive of black-leg or quarter-ill:—

32. R. U., Orkney, writes: "I was on a large farm for about twenty years. I recollect fifteen calves died of quarter-ill in one

year. The late Captain Barclay of Ury published his experience in a letter. His plan was to give about 1 lb. of oil-cake daily until the calves were put on grass next season, commencing when weaned. This was adopted, and there was no more quarter-ill."

33. R. A., G., writes: "I approve of 1 lb. of oil-cake daily to every calf. I give this, and use the seton steady. None die of quarter-ill now, and many did so before."

34. Mr C., a farmer, writes: "I take my young beasts into the house pretty early, in the autumn at least all night, and for a few weeks about the end of grass and the beginning of winter I give some oil-cake. I pay good attention to their comfort and cleanness. I don't let them get too fat or too lean, and I am not troubled with quarter-ill."

35. A. M., C., writes: "I give oil-cake as a preventive for quarter-ill. I have done it for nine years, and have never lost any of my calves that got oil-cake during the winter. I have lost three in a season before."

36. J. L., of A., writes: "The Hereford breed of cattle that I have now had for more than twenty years seem well adapted to this northern climate, having only lost one, a calf, of all the herd, some years ago. It was supposed to be attacked by quarter-ill. Since that time I allow a small quantity of oil-cake to be given to the calves the first winter, which not only keeps them in better condition, but is said to be a preventive of quarter-ill; at any rate I have lost no more than what I have stated of either young or old of any disease whatever."

37. A. M., C. K., writes: "From all I can hear the setoning of calves is not general in this quarter. A few give oil-cake as a preventive of quarter-ill. I have done so for some years, and have never lost any of my calves that got oil-cake in winter; previously I lost many."

The above-noted quotations are a few of the most prominent from a mass of letters now before me, selected not that they differ in sentiment with the others, but because they are the most concise, and represent the largest number of animals. They are the spontaneous expression of the experience of practical men engaged in agriculture—men of all grades, from the small farmer with his *three calves* yearly up to the large stock-master who raises yearly nearly *three-score calves*—all are agreed that setoning the dewlap or a little oil-cake, or perhaps both, are almost *certain preventives* of *black-leg or quarter-ill.*

Young beasts should be accustomed to eat oil-cake about the time they are weaned. In addition to its value as affording the proper pabulum to special organs and elements of the body, and thereby assisting in the prevention of quarter-ill, it is admirably adapted for securing the development of the whole body, and is

therefore intrinsically valuable as a general article of food. In connection with, and pertaining to the prevention of black-leg or quarter-ill, I shall here insert a few

General Observations on the Raising of Young Stock.—By supplying young animals with food rich in the elements of albumen, fibrin, and casein, or substances convertible into these, the normal state of the body and blood may be maintained, and the risk of the attacks of diseases, such as black-leg, will be materially lessened. I find that the oat straw furnished to cattle often contains very little real nourishment, but a very small quantity of protein compounds, not above 1½ per cent of nutritive value, good hay about 8 per cent, while 61 lbs. of good turnips are equal in feeding value to only about 2 lbs. of average oil-cake.

A knowledge of the quantity and nature of the food necessary to be furnished to the young animal, suited to the breed, age, and condition, would go far to enable the stock-master to raise and treat his animals in a safe and profitable manner. The feeding properties that straw presents are very various, arising from several causes—the kind of grain, the nature of the soil, the variety of season, and the condition when harvested—all these will have their influence on the nutritive properties of straw. The same may be said of turnips—the kind of turnip, the manure employed, the season and the soil—all these affect the feeding properties of turnips. One thing has appeared to me strange and shortsighted, that any person conversant with agriculture should purchase the so-called artificial food, so much advertised in the public papers, for the purpose of fattening our domesticated animals. Why, those who compound and sell such artificial food cannot have access to a single ingredient but what the farmer can furnish for himself at about one-fourth part the price asked by these venders. The whole secret consists in the stock-master becoming familiarly acquainted with the selection and the proper appropriation of the food. The practical farmer should know that the young animal has different wants from the full-grown one; that it requires phosphates and bone-earth to build up and strengthen the solid parts of the bones—milk, good straw, barley, oats, wheat, and hay contain these. Again, elements are necessary for the production of muscle, gelatinous tissues, and the soft parts of bone—well adapted for this purpose are pease, beans, bran, or linseed; and for even young stock a certain amount of food convertible into fat is necessary—turnips, potatoes, and linseed-cake are here indicated. All the above, or proper substitutes for them, may be had by the farmer in any quantity, of the best quality and at the cheapest possible rate; aud I shall now add a few hints as to the manner in which this may be accomplished.

No single substance that we possess, so far as I am aware, can rival oil-cake as a compound for feeding live-stock, still, *its* com-

position being accurately ascertained, *could not a compound be made up, of other kinds of food, equally as good in feeding properties, and at the same time cheaper than the oil-cake?* Now, it is well known that oil-cake generally contains from 22 to 25 per cent of protein compounds—that is, albumen, gluten, &c. In this respect the pea and the bean are the only seeds that approach it, the pea containing about 24* per cent, and the bean sometimes as much as 28* per cent, of protein compounds. Again, oil-cake contains a great amount of fatty matter, sometimes nearly 12 per cent, oil or fat in some cheap form or other must therefore be added to any mixture that is to rival or be equal to oil-cake. If, with 90 lbs. of beans, we could mix, grind up, or otherwise incorporate 10 lbs. of oil or fat, we should have a compound nearly equal in all but one respect to an equal weight of the cake from the natural seed. Thus 100 lbs. of English oil-cake, and 100 lbs. of beans so prepared would consist respectively of—

	Oil-cake.	Bean-mixture.
Starch, sugar, and gum or mucilage,	39	40
Gluten, albumen, &c.,	22	25
Fat,	12	12
Saline matter,	7	3
Water and husk,	20	20
	100	100

On comparing these two columns, we see that the mixed beans have the advantage in regard to starch and gluten, and are defective only as regards the inorganic or saline matter; of this last the beans contain only one half as much as oil-cake. An addition of 6 lb. of bone-meal, recently ground and in a fresh and sweet state, would supply the deficiency of lime and phosphates, and would make a mixture equivalent in chemical composition, and therefore, I should hope, equal in fattening and other virtues to an equal weight of oil-cake. Thus the proposed mixture would consist of

Prepared beans,	90 lb.	
Oil or fat,	10 „	Fine linseed oil would do.
Bone meal,	6 „	
	106 „	

The principal difficulty attending the above composition would be in procuring and mixing the *fat* with the bean meal, but the same end may be attained in a different way; the linseed of good quality contains upwards of 20 per cent of oil. A mixture, therefore, of

Bruised linseed,	40 lb.
Bean meal,	60 „
Bone meal,	4 „

* Professor Johnston.

would contain of the several constituents which are essential to the value of the mixture about the following:—

Starch, ...	40 lb.
Protein compounds, . .	27 „
Fatty matter, . . .	11 „
Saline matter, . . .	7 „
Water and husk, . .	19 „
	104 „

This mixture comes very near to that of oil-cake, and might be admirably adapted for preserving animals, especially young stock, in a healthy state.

SECTION V.—TREATMENT OF BLACK-LEG OR QUARTER-ILL.

The treatment of this disease is known to be a most unsatisfactory and hopeless task. I believe of 1000 cases 999 die in defiance of any treatment. I have myself seen a few cases that were amenable to treatment, and recovered. To give any chance of a recovery, the affected animal must be early observed. This is not often the case, as the affection is very insidious; also the affected part must be external to the vital organs of the body, must not involve any joint or the head, &c. Unfortunately the disease is not often observed until congestion has taken place—a local effusion peculiar to this disease—and if the local determination is internal, or deeply seated amongst the muscles, in any joint or about the spine, the throat or the head, then, I think, nothing effectual can be done. On the other hand should its existence be early detected, be circumscribed in its action, having its local seat amongst the sub-cutaneous tissues, or superficial to the sub-cutaneous muscles external to the body, say on the shoulders, the ribs, or the thick parts of quarters, then it may be possible to relieve the suffering brute; and this must be done by exciting inflammation, not general inflammatory action, but an inter-current extraneous inflammation; and this is the best and only eligible means of raising the due proportion of fibrin in the blood, counteracting the deadly effects of the disease, and restoring the circulation to its normal condition:—Fomenting the affected place, and around it, with very hot water; rubbing all round with strong topical stimulants, such as aqua ammonia, spirits turpentine, in equal parts, with a little olive oil; mustard extracted by strong vinegar or spirits turpentine, and applied warm; or if the affected part be puffy, swollen, or edematous, it may be opened, and lint or tow dressings, saturated with Venice turpentine or strong digestive ointment, may be stuffed into the opening in order to induce an inflammatory or suppurative action. Setoning the dewlap may be tried even at this late stage,

putting strong ointment of the digestive kind on the cord; also keeping the bowels open by salts, oil, or croton.

Sheep.—In regard to sheep, their digestive system and circulation being, with slight variation, the same as that in cattle, and as in the present day they are in general supplied with food similar to that of cattle, I cannot conceive of any essential difference in the nature, treatment, or prevention of black-leg in the one from the other. A modification of the principles now laid down as applicable to cattle will, if adapted to the difference of habit, be found in every respect suitable for sheep also.

SECTION VI.—CONCLUDING REMARKS ON BLACK-LEG.

In conclusion let me present an abstract of the statistics of black-leg or quarter-ill, as handed to me by farmers and stockmasters, &c., men daily employed in rearing stock, and who are consequently the first judges of such matters, having ample opportunity of acquiring the necessary knowledge of all the external circumstances relating to cattle, young or old, under disease or in health. I have given a complete and truthful report of the whole facts, having myself no preconceived notion to substantiate; I have no inducement to keep anything back or add a single iota to the reports sent to me, my sole and only object being to bring out and establish the truth; and I believe there never was any one principle in the pathology of any disease more clearly brought out than that black-leg can be prevented by the proper application of the preventives now pointed out, and the efficiency of which has been fairly proved by practical men. They are simple in themselves, their action and effect has been clearly demonstrated, and independent of their special action in reference to black-leg, some of them are the most beneficial agents the stockmaster could employ for the growth and development of his young animals. In fine, let the plan now pointed out, and recommended after proof had in thousands of instances, be pursued, and black-leg as a disease will disappear from the farmer's stock, and the place of its name be found empty in his calendar of incidents. From answers to my circulars, from authentic and correct letters, and memoranda now before me—exclusive of calves setoned this autumn—I find the number of calves setoned is 6454. This is the number of which I have had authentic information; out of this number 31 have died of black-leg, thus giving an average of *one* in every 208. The same documents inform me—the farmers' own testimony—that of an equal number of calves previous to adopting the seton they lost 1075, or otherwise, that *one* in every *six* died of black-leg.

Many of the letters received on this subject report that the writers never had black-leg on their farms, and consequently do not seton. I simply say, if they did, their evidence would be

useless. It is the stockmaster who lost steadily previous to setoning, but who does not lose after, whose evidence is a proof; and it is remarkable and confirmatory of the principles laid down, that in no known case has the seton been tried and failed.

Small as is the average of those animals that have died after being setoned, it is augmented by the two following circumstances:—Some farmers who seton their stock themselves put the seton *too near* the animal's head; it has too little hold, excites little action, and is comparatively useless. Another circumstance is, a farmer loses a few stirks in black-leg, instantly the remainder is setoned; is it any wonder that more of them die of black-leg? The predisposing causes were so strong that the seton would have required to perform a *cure* to save the animal. See case No. 5 in report; the farmer was the setoner here. Of those that have been properly and timeously done—September and October is the best time—after the manner recommended in this report, not more than *one* in 300 *died of black-leg*.

ON THE RECLAIMING OF TOXSIDE.

By William Tait Burton, Proprietor.

[Premium—Gold Medal.]

The estate of Toxside is situated in the parish of Temple and the county of Mid-Lothian. It is about thirteen miles south by east from Edinburgh. The distance by road is fifteen miles. It is ten miles from Dalkeith, and a like distance from Peebles. It is bordered on the north by Lord Rosebery's property in Mid-Lothian, and Sir George Clerk's in Peeblesshire; on the west by Peeblesshire; on the south and east by the Haddington and Peebles turnpike, which skirts the estate for about two miles. The Dalkeith and Peebles road passes through the property for a third of a mile at the north-west corner.

The extent of the estate is about 1100 Scotch acres. The elevation varies from 820 to nearly 1000 feet above the level of the sea. The highest part of the property is Toxside-hill, which is now let as a separate holding; all the rest of the land is in my own occupancy. Toxside-hill, which is the north-eastern corner of the estate, forms the western extremity of an elevated plateau, which runs for a short distance parallel with the Muirfoot range, from which it is separated by a level valley about a mile in breadth.

This portion, which is about 100 acres in extent, is nearly rect-

angular; the south-western corner forming a salient angle, of which one of the sides runs north, and the other east. The surface is nearly level, dipping gently to the north and east. It is elevated about 150 feet above the plain on which Toxside stands, to which it descends on the southern and eastern faces by a rapid and pretty uniform slope of about 1 in 6.

The rest of the property consists of a gently undulating plain, intersected by numerous small sluggish streams, affluents of the South Esk, and which drain but very imperfectly the land through which they flow. To one looking down from the ridge of Toxside-hill, the whole country presents a singularly flat aspect — wide stretches of black moss, apparently dead level; varied here and there by a broad and low gravelly hillock, like sandy islets on the surface of a still sea. Such, indeed, is more or less the character of the district in upper Mid-Lothian, which lies between the mountain limestone and the silurian of the Muirfoots, and contrasts very strikingly with the hills and glens peculiar to these formations in this neighbourhood.

The whole property is on the lower carboniferous sandstone. The soil on Toxside-hill is a stiff tenacious clay, resting on a deep bed of dark-brown clay, admirably adapted for making tiles. To the north, about a quarter of a mile from the ridge of the hill, and where the level has fallen about 50 or 60 feet, the clay is succeeded by a deep unimprovable flow-moss on the mountain limestone. To the south and west of the ridge, the clay continues about half-way down the steep slope, and then gives way to dry sharp land on a gravelly subsoil, resting on the sandstone underlying the lime. Further west, and not far from the middle of the lower part of the property, the sandstone crops out, and affords a most excellent building-stone, of easy access, an equable, close-grained, dark-red stone, which may be taken out in blocks of almost every size.

Both in the immediate neighbourhood of this quarry, and in the other rising grounds, the soil is generally light and friable, and the subsoil gravelly. The level moss, so far as I have been able to observe, rests upon clay; but it would be exceedingly difficult to ascertain what is at the bottom of some parts of it.

If I have rendered intelligible my description of the lands of Toxside, it will be seen that there is very little natural shelter. The level-lying fields of Toxside-hill, being higher than any land in the immediate neighbourhood, are exposed to every wind that blows. The fields which lie on the steep slope descending from the ridge of the plateau to the low level grounds beneath are protected from the north and east. But from all the westerly winds, which are the prevailing winds in the district, there is hardly any shelter on any part of the estate. Situated at the western extremity of a long level valley running east and west between the Muirfoots on the south, and the low undulating hills belonging to the mountain lime-

stone on the north—the low lands lying across the mouth of the valley, the high lands crowning the end of the ridge which forms its northern barrier—every field on the property is fully exposed to the wild west wind, which comes with unchecked fury over the bare level lands which stretch for miles and miles in north Peeblesshire.

Toxside was bought by my grandfather, the late Thomas Tait, near the end of the last century, for the sum of £3500. It was then held by a tenant on a lease of nineteen years for the yearly rent of £102.

The appearance of the property was at that time desolate in the extreme. There was from one end of it to the other neither ditch, dyke, hedge, nor tree. A few willows skirting the stagnant pools only added to the dreariness of the scene. A part of it was under a certain kind of tillage; but even that part was cultivated to little profit. From want of draining, the ground was often lying full of water when it ought to have been ready to receive the seed. Late sowing made late reaping; and in all but unusually early seasons the harvest was very precarious. Of the rest of the land, the small portion which was naturally dry was under a rude system of rotation. A part here and there was taken up, the only boundary of the fields being the very natural one of the capability of the land to bear the horses and ploughmen. A crop or two of oats was taken off, providing fodder for the cattle and manure for the infield farm. It was then laid down in grass, and left in pasture, to await its turn to receive the plough. The natural pasture was left to nature. Not a tree had been planted to shelter the stock from the blasts of winter; no attempt was made to get rid of the stagnant water; such a thing as a surface-drain was never thought of. Many acres of now valuable land—of the most productive land on my property—were then entirely useless to man or cattle, in many places impassable—the dreary abode of the wild-duck, the curlew, and the snipe.

The house and steading were about half a mile from the turnpike, which skirts the property on the south-east. They were approachable, or said to be, by what in courtesy was called a road; but was in fact a mere track hardly passable in wet weather. All the buildings were in a miserably ruinous condition. The dwelling-house was mean and uncomfortable, and the steading afforded hardly any accommodation for wintering beasts, so that it was utterly impossible to manage stock economically, or indeed to cultivate the arable land with profit.

At the expiry of the lease, which was current at the time of the purchase, the property was let in portions to three small tenants, whose united rents amounted to nearly £300; but as they never paid their rents without grumbling, complaining that their farms were too dear, I determined to take the land under my own manage-

ment, with the intention of bringing it into a proper state of cultivation. This resolution I carried into effect in the year 1835.

Before giving a detailed account of the improvements I have carried out, I shall first state how I was situated with regard to the supply of the necessary material.

1. *Stones.*—In the quarry already mentioned I had abundance of excellent stones, suitable for all kinds of building, of ready access and easily quarried.

2. *Lime.*—There are lime-kilns on the road skirting my property on the east, less than a fourth of a mile distant, and on the road passing through it on the north-west about half a mile distant, reckoning in both cases from the nearest point of my land. The greatest distance I have had to drive lime to any of my fields is about two miles. It is sold at the kiln at 2s. per boll, or 10s. per ton.

3. *Tile.*—When I began my improvements, the nearest tile-work was at Dalhousie, upwards of eight miles distant. But it was not till I erected a tile-work at Toxside-hill that I made extensive use of tiles in draining. I bought them from the lessee of my tile-work at £1 per 1000 3-inch pipes and collars, which was the kind I chiefly used.

Improvements—Buildings.—About half a mile from the public road on the east, on a site sheltered from the east and north-east, and where I had an ample command of water-power, I erected a residence for my family, and a steading with thrashing-mill, courts, cattle-sheds, &c., suitable to the size of my property; and afterwards, at a convenient distance, cottages for my hinds. These buildings cost me upwards of £3000. I then made a good road to the turnpike at the cost of £50. I have since, from a spring near the top of the slope of Toxside-hill, brought down water to the homestead, not only sufficient for household purposes, but also providing an unfailing supply in the courts, which I find to be of inestimable advantage to the cattle which are kept on straw.

Management of Land.—After partially draining the land I intended to make arable, I divided it into fields of a suitable size. Exclusive of the land at Toxside-hill, which I let along with the tile-work, I formed nine fields, varying from 27 to 40 acres. In laying out my land, I always took into consideration the supply of water for cattle. In all my fields at Toxside I have managed so as to have a running stream passing through them.

These fields have been all drained and limed. I apply from 30 to 40 bolls (from 6 to 8 tons) per acre. The lime costs at the kiln 2s. per boll. The expense of driving varies of course with the distance of the field from the kiln. It may average on my property 10s. per 15 bolls, or 3s. 4d. per ton. The lime I generally apply to the lea the year before lifting it. Sometimes I employ it during other parts of the rotation in the form of compost, giving a greater

or smaller quantity, according to the richness of the compost and the condition of the soil. Although I have made no formal experiment to ascertain the effect of lime, by observing the difference of the crops on limed and unlimed parts of the same field, yet I may safely say I have had abundant evidence of its value in ameliorating and enriching land. In my fields I estimate the increase on the corn crop at about two quarters per acre. But it is not to the grain crop immediately following that I look for my return from the lime; but to the turnips, and especially the grass. The latter is not only earlier, and more abundant, but is better in quality; at least such is the opinion of the best judges, the cattle and sheep, which invariably find their way first to those parts of a field which have been limed.

Draining.—The depth of the drains is 3 feet 6 inches, or from that to 4 feet. The distance between them I varied according to the soil. In light friable lands, with an open subsoil, they are 30 feet apart; in stiff tenacious clays only 18 feet. In some cases, where I found that at the former width they did not dry the ground satisfactorily, I have been compelled to put in a drain between every two, thus making the distance only 15 feet. Indeed it seems self-evident that, as land varies so much in the facility with which water percolates it, there can be no uniform rule, or one to adhere to in every kind of soil. In this, as in everything else, we must modify our practice to suit the peculiarities of the individual instance. With regard to the expense of draining, 2-inch pipes and collars cost £1 per 1000; cutting the drains, 3½ feet, perhaps, upon an average, 1s. per rood, including laying the tiles and filling-in; driving depends upon the position of the field, but may be estimated, including laying down the tiles alongside the drains, at 4s. per 1000.

From the very flat nature of by far the greatest part of the land, the numerous small streams by which it is intersected flowing almost level with the surface, I experienced great difficulty in draining it. I may mention one or two instances to illustrate the shifts to which I have been frequently put.

A considerable stream passes through one of my fields, and is joined further down by another, which flows along the side of the field. Between these streams lay a considerable number of acres of good land continually under water from springs. To drain this land I first cut a main drain large enough to contain all the water from the lateral drains. But as this drain was on a lower level than the bed of the stream, it was evident I could get no outlet for it there. I had, therefore, to carry it across one of the streams through metal pipes sunk under the bed of the stream, and to continue it a considerable way across the field below, until I got slope to carry off the water.

A meadow on the north side of my steading, of about 8 or 10

acres, was so wet that I almost despaired of succeeding in draining it. The difficulty arose from the circumstance that a running water skirted the north side of the meadow, almost level with the surface. I had to carry my main drain along the side of the river to a great distance below, to where the fall of the stream enabled me to get an outlet for the drain. I then completed the draining, and by that means, and by the application of lime, I have had for several seasons crops of oats, of turnips, and potatoes, on ground which formerly seemed a hopeless marsh.

This want of declivity frequently gave me very great trouble. Between the cultivated ground on Toxside-hill and Lord Rosebery's property to the north, there is a great extent of moss land, very soft and very wet. As the fields on Toxside-hill descend by a gentle slope to the north, that moss is the natural outlet for their surface-water. The lowest line runs east and west, but along that line it is almost dead level for about two-thirds of a mile. I had the ground levelled by the late Mr Turnbull, road-surveyor of Peeblesshire. For the distance of more than a quarter of a mile I had a fall of only 3 or 4 inches. To make the most of it, I dug in a westerly direction across the moss an open ditch about 180 roods, 6 or 8 feet wide at the top, about 5 feet deep, and in some places 7 or 8 feet. By this means I have been enabled to drain thoroughly the good land on the south, and also to bring into profitable cultivation 6 or 8 acres of moss land on the same side, which were cut off from the rest of the moss by the intersection of the ditch.

I shall only add another instance. The higher grounds which overlook my property on the south sent into a complete moss a good deal of surface-water which had no natural outlet without inundating to the extent of several acres, what is now one of my best fields. To get rid of that surface-water, I cut a 4-feet wide drain, and nearly 4 feet deep. I then caused peats to be cut out of the moss, so as to form drains at nearly right angles to that main drain. I did that for several years, until I saw that the surface of the moss was in a great measure dried. I then caused the main drain to be deepened by 3, 4, 5, and in some places even 6 or 8 feet, and then surface-drained the whole. Having at length made it sufficiently dry, I lately planted it, fencing it with a stoneface-dyke and hedge; and I have no doubt that I shall soon have a thriving hedge and flourishing trees where not long ago there was nothing but black peat and stagnant water.

Many more examples of a similar kind might be given; but I trust that what I have said will be sufficient to justify my opinion, that there are very few lands which may not be thoroughly drained, however level the surface, and however unfavourably circumstanced with regard to an outlet for the water.

There are 1200 roods of wide open ditches on the estate, made both for the purpose of acting as leading drains, and for forming,

along with fail-dykes, fences for young plantations. These vary in depth from 4 to 8 feet, according to the level of the ground. The soil and subsoil through which they had to be cut was also of very varied character, and consequently the cost of making them varied too. It would lead me too much into detail to give the particulars in each instance. I shall have to recur to the subject when speaking of fences; but I may mention that the long ditch across the moss at Toxside-hill, and which serves both as a drain and sheep-fence between the cultivated land and moss, cost 6s. 6d. per rood. It is 2 feet wide at bottom, with a gradual slope on the north side.

Having had considerable experience in drying and improving moss land, I may explain the system I have generally found effectual for that purpose. Having drained it, I turn it over to the action of frost and the air. When dry enough on the surface, I set fire to it, when sometimes it will burn for weeks together. This causes a subsidence of the soil, and in part manures it. I invariably apply lime to it, to the amount of 40 bolls per acre, and sometimes the cleanings of hedge-sides and ditches. The drains first put in I have frequently found not to be deep enough. When that is the case, I either lift them and lay them anew, or put in other drains between them, deeper than the former ones.

I may mention a case of the successful improvement of peat-moss by the blacksmith here, who has a small holding from me. He dug peats out of it for many years; and bit by bit, as he cut it down to a level, he drained it, by my advice, and assistance in giving him the tiles. He now grows good crops of oats and potatoes. Were landlords generally to assist their tenants in carrying out improvements, much land at present lying useless might be brought into profitable cultivation in our higher districts.

Indeed, I am of opinion that all, or nearly all, the lands I possess are capable of improvement; and I trust that a time will come, when the impassable morass and the black moss-hag will wave with ripening corn, or bear valuable crops of turnips and grass. But I have all along gone upon the principle of taking no more upon my hands than I am able to do well, and of directing my efforts first to those lands which will yield me the best return; and I trust that, by leaving no day without its appropriate labour, and by adding gradually, from year to year, field after field to my arable farm, the whole property will in time be brought into a state of as good cultivation as that which is now under the plough.

Expense of Reclaiming Moss Land.—I have already spoken of the expense of lime and tiles. To that there only remains to be added the cost of paring and burning, which may amount to £3 or £4 the acre.

Plantations.—In high and exposed districts there is nothing that tells more to the advantage of stock than shelter. In the knowledge

of that fact, I have all along, since I commenced my improvements, united planting with draining and liming. The land under wood in the arable farm amounts now to between 50 and 60 acres. The plantations are, in some cases, belts between the fields, and in others clumps of various forms and areas, laid out in the manner I considered best calculated to give shelter to the stock. With this view, I have seldom planted the belts of a uniform breadth, but with salient and re-entering angles; so that, in coarse weather, when the wind is driving along the sides of the fields, the sheep and cattle may always be able to find a sheltered corner. The belts, therefore, vary in breadth, but perhaps upon an average they may run about 60 yards across. The trees I have planted are Scotch fir, larch, and spruce, with some hardwood interspersed, principally elms, ash, and a few oaks. Scotch fir and larch seem to thrive best, especially where the land was anything dry when they were planted. But I cannot call any of the trees unhealthy. They all seem thriving. In the year 1849, a severe frost, which occurred in April, after the trees had started, caused a good deal of injury to many of the larches; from which some of them, however, recovered, sending out new shoots below the part which had been destroyed.

When the trees are about six years old, I cause them to be slightly thinned, continuing the process from time to time as they seem to need it, always avoiding taking out too many at once.

The trees are all too young to have as yet any value as timber; but, having erected a saw-mill in connection with the water-wheel of my thrashing-mill, I am enabled, from the thinnings, to furnish all the stobs and rails I require for fencing—trees about fourteen years of growth, often being strong enough to cut for stobs. Thus, besides being an ornament to the property, and a protection to the stock, the plantations have been for several years a source of very considerable saving, and have enabled me to carry on the improvements at less expense than would have been otherwise possible.

Expense of Planting.—Planting has cost me about £3 to £4 per acre.

Fences—1. *Stone-dykes.*—They are built 5 feet high. The foundations are 28 inches wide. At the height of 2 feet a band-stone is inserted, adjutting over on both sides. From this the dyke is gradually diminished in thickness to 16 inches at the top. On the top a rough coping is placed, generally on a bedding firmed with lime. When this is done, I find the dyke is always stronger, and stands longer. There are on Toxside 1005 roods of such dykes. There are, besides, two miles of march-dykes built in the same manner. The masonwork costs about 3s. 4d., and the quarrying and driving materials about 6s. 8d. per rood.

2. *Hedges, with a Ditch in Front.*—They are planted in the following manner:—The thorns having been laid on a bed as well prepared as possible, the ditch is cut 4 feet wide at top, with a slope

from the hedge, and 2 feet deep, and the stuff taken out of the ditch is laid on the roots of the thorns. The ditch costs 2s. per rood, and the plants about 12s. 6d. per 1000. I plant three thorns and two beeches.

3. *Face-dykes, with a Hedge on Top.*—The face-dyke is built 3 feet high. The thorns having been laid on the bed prepared for them, the earth is taken out in front, so as to make the ground slope backwards for several feet from the base of the dyke. The earth thus obtained is laid on the roots of the plants, as in the former case. The face-dyke costs in all about 4s. per rood.

4. *Fail-dyke, with Ditch in Front.*—The ditch is cut 3 feet deep, 6 feet wide at the top, narrowing to nothing at the bottom. With the sods taken out, a dyke is carefully built at the inner edge of the ditch, 3½ feet high, 32 inches wide at bottom, and gradually narrowing to the top. This fence is executed at 3s. per rood.

System of Cultivation.—I keep my arable land on the five years' shift—1. Oats; 2. Turnip or potatoes; 3. Barley or oats; 4. and 5. Grass. I sometimes take a crop of clover-hay the first year of the grass, but more generally I pasture both years. In laying down my fields for pasture, I use the following seeds—viz.: red, white, and yellow clover, timothy-grass, cow-grass, rib-grass, and alsyke, mixed together to the amount of about 14 lb. per acre. Along with the above, I generally allow one bushel of perennial rye-grass. The oats which I am most disposed to sow are sandy and early Angus. Common barley, I find, suits the locality best.

The cattle I keep are the short-horned. I usually bring up twenty calves. I keep them two years—giving them the first winter full turnips, the second winter only straw at first, then for two months half turnips, and full turnips for about two months before disposing of them, which I do in spring to the grazier.

My sheep are all Cheviot. The breeding stock are kept on the open unimproved pasture; and the five-year-old ewes are brought into the parks to be fitted for the butcher.

Results.—What I have said above will serve to illustrate some of them; but they can be fully appreciated only by one who saw Toxside thirty or forty years ago, and can compare what it was then with its present state. What was little better than a bleak moor is now converted into fertile fields, divided by flourishing woods, a shelter to the sheep during the wintry night, as well as now grateful to the eye this sunny spring.

But to speak in more definite terms. When I commenced my improvements there was on the property 111 acres said to be under cultivation. What that cultivation was I have endeavoured to describe. There are now, including Toxside-hill, 400 acres well watered, well sheltered, of convenient access, and capable of producing abundantly every kind of crop suitable to this high locality. One instance of improvement I may specify, that of one field of upwards

of 40 acres. The former tenant carried the produce to his peat-stack. I carry it home to my barn-yard. Where were moss-holes full of water, and turf only dug for fuel, the plough turns up the soil and prepares it for the seed. The whole field is now perfectly dry and very productive, rewarding me for my labour with crops of oats, turnips, and grass—and very heavy crops they have been, the straw sometimes measuring 6 feet long. I do not generally grow wheat, I consider it rather a precarious crop in this high climate. But one year having sown it after fallow on 7 acres of very stiff clay land on the brow of Toxside-hill, almost 1000 feet above the level of the sea, I reaped 14 bolls per acre, which I sold about the average price of Dalkeith market.

When I took the property into my own management, I received in the usual manner the sheep stock of the out-going tenant. That stock consisted of eighteen score of black-faced sheep of a very inferior description. I have now twice that number of Cheviots, which I believe to be second to none in the whole district. On the first of April last I sold my great ewes at House of Muir for 41s.—the highest price in the market.

The rearing of stock and the cultivation of land have ever been my great delight and employment. In pursuing these avocations I have been unspairing of my money, although I have always tried to be as economical as possible. My outlay no doubt has been great — and in carrying out improvements I have had many difficulties to contend with. But however uncertain at times might be the prospect of success, I have ever been induced to persevere in the faith and hope that, though I seemed to be casting my bread on the waters, I should yet find it after many days. I have persevered, and I am happy to say that, under the blessing of Providence, my labours have been crowned with success. There is still much to do, many acres to bring under the plough, and so far from resting satisfied with what I have done, I am resolved still to go on, and I would exhort all similarly situated to make a like experiment. I can confidently appeal to my own experience, as a proof that land, even in high and exposed districts, and in many respects unfavourably situated, can be brought into a state of profitable cultivation. Let them then learn to labour and to wait. They must wait;—they cannot earn their reward in a day or in a year. They have need of patience. But let them be assured that, if they do persevere, they shall reap in due season; and let them be strengthened, as I have been, by the persuasion that they are doing good, not to themselves merely,—they are promoting the welfare of their fellow-men; for, by putting the plough and the draining-spade into the barren moor, they will not only increase their own store, but they are adding to the resources of their country.

ON THE CULTIVATION AND USE OF WILLOWS.

By JAMES FORBES, Gardener, Monymusk.

[Premium—Medium Gold Medal.]

THE willow (Salix) belongs to the natural order *Saliccaceæ dicotyledonous.* About seventy species, besides a number of very distinct varieties, are natives of Britain, and about one hundred and sixty have been introduced from other countries; a very large proportion of them from continental Europe, and particularly from Switzerland; many or most are ornamental; several are medicinal; a few possess considerable value as timber trees, and almost all are in some way or other useful. The principal species expressly cultivated for the use of basket-makers are termed osiers; and the most abundant indigenous species of a rigid habit, forming tough bushes or large trees, and used in other departments of economy than basket-making, are in many districts popularly called sallows or willows.

The importance of willows to man has been recognised from the earliest ages. A crop of willows was considered so valuable in the time of Cato, that he ranks the willow-field next in value to the vineyard or garden. "There is not a single twig of the meanest willow," says Dr Walker, in his work on the Belrides, "but what may be turned to some useful purpose."

This leads me to a consideration—viz., in what way could they be disposed of to the best advantage for baskets and other industrial purposes. I need not enumerate the various purposes for which they are employed, but simply remark that the basket-maker, the turner, and the cooper, would be less economical and useful were it not for the genus (Salix). Charcoal and cases of lead-pencils are also made from the willow wood. Boards and planks of the willow are well fitted for scaffolding, and sheeting for carts, lofts, &c.; and in localities where small timber are scarce we cut it up for paling-rails. Being of a tough nature and light, it is very well adapted for these purposes. The very best kind of charcoal is made from willows, and is highly esteemed in the making of gunpowder. The bark is used for tanning several kinds of leather. So from this we may learn that the consumpt for willows, if more extensively grown, might be greater; and plantations, or large beds of osiers, might be very advantageously grown in almost any soil, such as banks of rivers, drained moors, &c., and, annually cut, would produce a sum of money that I have no doubt would largely remunerate the grower. And from land that cannot otherwise be made available for tillage, notwithstanding the vicissitudes of seasons, taking good and bad under view, the writer

has experimentally ascertained that an acre of willows or osiers will often bring the grower a larger sum of money than an acre of wheat; and likewise from land that would be almost useless for other kinds of crops.

It is rather astonishing that the growth of them is not more attended to both in England and Scotland.

As regards the nature of the soil and subsoil suitable for growing them in to the best perfection, osiers delight in banks of rivers or drained moors, and are greatly invigorated by occasional floods or irrigations. Plantations of them may also be formed, and will succeed well, on low spongy bottoms along the margin of streams, in almost any lowland district of Britain.

In the great majority of farms are to be found level, marshy, wet spots, which, by drainage, cannot well be made available for tillage, which might be planted with the willow, and would afterwards recompense the proprietor or farmer in a twofold way. The land might be prepared in various ways for this crop, owing to the extent and nature of the soil. Where the land will admit of being ploughed and harrowed, and has formerly undergone cultivation, I find that, at the present prices of willow sets or plants, and the expense of labour, it would not cost more than £8, 15s. per English acre, allowing the plants to be planted at a distance of 28 inches by 18 inches apart. But I find that for plantations of any considerable extent for osiers, the ground should be formed by the spade into beds of from 8 to 9 feet broad, with intervening furrows or narrow ditches to carry off the water. The plantation may be made at any time between the fall of the leaf and an advanced period in spring; but the two last weeks of February and first week of March are the most proper times for planting the willows. Cuttings 15 inches long should be taken with the knife on an upward slope from well-ripened wood of either two or three years' growth: experimental trial convinces me that they grow more luxuriant when planted about two-thirds of their length in the ground, than when they are less deeply put in the ground.

Having at one time about an English acre of willows under my care, it all received the same preparation; but after the number of cuttings required were lopped off from the plants of second year's growth, and dressed to the length of 15 inches, I caused the sets or cuttings of No. 1, or one-third part of the said acre, to be put in the soil to the depth of 10 inches. No. 2, as another third part of the same, had its cuttings planted to the depth of 7 inches. No. 3, another third part, planted to the depth of 4 inches. A decided difference was yearly to be seen on the growth of the plants—No. 1 producing in autumn of the third year one-fourth value of more willows than that of No. 2; and No. 2 equivalent, or nearly so, to the same value over No. 3. I can learn from frequent trials that, where

depth of soil can be obtained, osiers succeed best in a deep, moist, free soil—ground to be dug to the depth of 24 inches, with a small quantity of dung and old lime-rubbish put in the bottom of the trench.

When willows are planted in stiff tenacious soils, they are much more tardy in growth, and very liable to the ravages of a brown bug, which is accompanied by a black caterpillar, often making great ravages. The ground should be hoed and kept clean: the space will well admit of this, as osiers should in no case be planted closer than 28 inches by 18 apart. The expense of preparing osier plantations by spade-work in this way, of course, depends much on the nature and situation of the land; but in ordinary soils, drains can be cleared out to the depth of 30 inches by 22 inches broad at surface, bearing a scarcement of being 12 inches broad in bottom. This form of a ditch can be made throughout at from 5½d. to 6d. per perch, and the ground of an English acre, trenched and prepared to the depth of 2 feet, for £6, 10s. 6d., or nearly so, and planting performed at about 18s. per English acre. The willow, for the use of the basket-maker, should be cut every year slopingly with the knife, within three buds of the point whence the shoot issued, and will admit of being cut back once in three years for the use of the cooper, exactly to the swell of the shoot of the three years' growth—thus compressing the plant back to its ancient dwarf form, at same time realising a handsome return.

Moreover, by treating osiers in this way, they will last and produce well for a great many years. The ground should be deeply stirred with the hoe and kept clear of weeds; but digging with a spade around the roots of willows often proves very hurtful to the fibrous feeders, as we often meet with a great portion of such oosing and growing very near the surface of the soil. Plantations of osiers thus treated, notwithstanding the vicissitudes of the seasons, will bring the grower at least the sum of £12 sterling for every year after they arrive at their full stage of growth. This sum of £12, I have minutely tested, can be at the present time realised from an English acre of willows, after all expenses of cleaning and cutting down the crop are deducted.

The best Varieties and most profitable Applications.—The kinds most approved of for pollarding coppice-wood, fuel, poles, or bark are the Huntingdon willow (*Salix alba*), and a variety called the red-twiged or Bedford (*Salix Russelliana*).

The best sorts for osier grounds are—1st, The common osier (*Salix viminalis*); 2d, The red osier (*Salix rubra*); 3d, The fine-basket osier (*Salix forbyana*); 4th, The velvet osier (*Salix molissima*); 5th, The long-leaved willow (*Salix triandria*); 6th, The golden willow (*Salix vitellina*). These are the sorts most esteemed for the various purposes of the basket-maker, the cooper,

and the turner. The way in which willows are most commonly disposed of, after being cut, is—they are sorted into trusses and tied into bundles of 2 and sometimes 3 feet in circumference; and if intended to be stripped of their bark, they are set on their thick end, immersed a few inches in standing water, and left there until the latter part of the following month of May.

It has of late been asserted by various respectable parties that as high a sum as from £13 to £14 of nett profit, and sometimes more, could be derived at the present time from an English acre of willows, under very ordinary treatment: they succeed best in northern exposures, provided they are not over-topped. Should the ground be at all suitable for the crop, each set will produce of the first year two good basket-rods, or 24,000—worth 6d. per 100 of 120. The second year, the sets, being much stronger, will produce on an average six rods, one more or less being considered a very common number—one of which may be left on each stock for hoops, and the remaining 60,000 cut for baskets, which would be worth much about £24 sterling. By the third year there ought to be at least 12,000 hoops, worth 4s. per 100 of 120, and from 28,000 to 29,000 rods, worth at least £13, 10s.

These results may be obtained even by fair cultivation under ordinary circumstances: of course, it may sometimes be difficult to obtain a ready market or sale for the basket-rods; the hoops we find to be always such, and much sought after. The greater part of those used in Ireland are imported and much sought after also, with commonly a very scanty supply. No hoops should be left by the third year on the plants, as the rods which grow under the shade of the hoops are seldom or ever strong enough. Mr Philips of Ely, in England, one of the greatest cultivators of osiers at the close of the eighteenth century and beginning of the present, says that he always obtained from £12 to £18 per acre, according to the fluctuation of prices, after deducting all costs of labour, &c., the red Welsh willow (*Salix purpurea*) and the white Welsh (*S. helix*), being at that time the two leading and favourite sorts, they being at that time disposed of in bunches an ell in circumference, after being peeled and whitened by compressing them in an iron hoop to this size. If the plants be not in any way destroyed by insects, to which in some years they are subject, under good cultivation, upwards of £10 could at the present time be realised of nett profit, after deducting all expenses of labour, from an English acre of osiers. And although an old adage in Lincolnshire, it is nevertheless still true, that a willow will buy a horse before an oak will buy a saddle. As to what towns and countries they are in most request, we find them in request in a great many large manufacturing towns and seaports, more especially in Dublin. The butter trade in Ireland causes a great consumption for hoops for butter firkins throughout the

season. I have witnessed hoops of hazel and black sally, as it is termed, sold at 12s. and 13s. per 1000, and the cooper cut them at his own cost; and in Dublin there is the Institution for the Blind, that requires to import a great many yearly to keep their hands employed. A much greater consumption for willows might be relied upon, were they but more extensively cultivated. In almost every seaport town of Britain, an accurate calculation has of late been made that at least 6000 acres of willows could readily be disposed off in Scotland and England, at prices that would very handsomely remunerate the grower.

ON EXPERIMENTS WITH ARTIFICIAL MANURES, IRRESPECTIVE OF EXPENSE, TO RAISE THE LARGEST AND SOUNDEST GREEN CROP.

By SAMUEL D. SHIRRIFF, Saltcoats, East Lothian.

[Premium—Medium Gold Medal.]

SINCE the introduction of guano, a new era in agriculture may be said to have begun. The apparent impossibilities of former days have been completely overcome. The limited portion of green crops which used to be grown but a few years ago, has increased in an extraordinary degree by the free use which is made of guano and the other special manures now at the command of the agriculturist.

As an illustration of the extraordinary increase which must have taken place in the produce of what used to be considered highly-farmed land, it may be stated that for certain crops sums equalling the value of the whole of the former produce are now annually expended in artificial fertilisers alone.

Let a commercial man look at the advertising columns of newspapers, and he must be lost in amazement at the numbers of individuals now engaged in the manufacture and sale of manure. How great, then, is the necessity for obtaining a knowledge of their relative value! Science has taught us a great deal, and I expect she will teach us still more; but experience is the true school for the farmer, and it is only by carefully-conducted experiments and repeated trials that he can really learn what is the most profitable fertiliser for the crop to which it is to be applied. Different crops and different soils require different kinds of food. As an exhausted frame or constitution can only be restored by having supplied what has been taken from it, so an exhausted soil can only be reinvigorated by having supplied what the cropping of a rotation has taken from it.

Some farmers place little faith in experiments, and continue year after year to throw away immense sums in the use of Peruvian guano alone, because they have found, as a rule, that it always tells where it is applied. They point to the conflicting results of experiments, forgetting the true cause of the variableness of these results—viz. the difference in soils, the different kinds of crop, also the purity of the manures, and accuracy in conducting the experiments. These are not mere probabilities, but I believe them to be the true cause of the confusion of opinion amongst farmers regarding what is the most profitable manure to use.

The following experiments may, I hope, throw a little light upon the subject. I shall proceed to state as clearly as I can all the particulars regarding them :—

I. PREVIOUS ROTATION OF THE FIELD.

Grass, oats, potatoes, wheat, barley, turnips, barley, turnips. The potatoes were heavily manured with about 25 cart-loads of farmyard manure per acre, and a mixture of guano, rape-dust, and superphosphate, at the rate of 4 cwt. per imperial acre. The barley, after wheat, got 3 cwt. Peruvian guano, and 1 cwt. superphosphate per acre. The turnips following received 20 carts of farmyard manure per acre on the stubble, and 4 cwt. of mixture of half Peruvian guano and superphosphate per acre in the drill. The turnip crop was a complete failure, owing to the nature of the season. The succeeding crop of barley was very good, and the next is the crop of turnips with which the experiments were made. The variety of turnips was East-Lothian purple-top Swede. The experimental plots were all sown on the 2d day of June.

II. PARTICULARS REGARDING THE APPLICATION OF THE MANURES.

The manures were sown by the hand by two people accustomed to the work, and in order to assist them in getting them to sow the proper quantity on each plot, consisting of ten drills, I made them sow ten drills at the same rate per acre immediately before beginning the experiments. *No farmyard manure* was applied with the artificial manures. It was a calm day—scarcely a breath of wind; the manures were therefore not mixed with each other. The field where the experiments were made is perfectly square. I made all the measurements with a line, and the calculations were made by a land-measurer.

III. RESULTS.

In testing the experiments, I weighed 50 yards of the four centre

drills of each experiment, on the north end of the field, where I thought the soil most equal.

In regard to the soundness of the bulbs, I could detect little variation, the quality of the turnips after the guano being quite as good as the others. In no season do I ever remember to have noticed so few decayed bulbs.*

The result of these experiments is, that the largest outlay has given the largest return, and it remains yet to be proved to what extent this may be carried with a profit.

I shall conclude with a few observations on the experiments themselves.

No. 1. Peruvian guano appeared far before all the others during the whole season, and the crop, when weighed, was the heaviest. I attribute this to some peculiarity in the season, because for three previous years I found a mixture better than guano alone.

No. 2. Phospho-Peruvian (Lawson's). I found this manure decidedly inferior to cheaper *home* mixtures.

No. 3. A trial of increased proportion of phosphates.

No. 4. For comparison with Nos. 2 and 3.

No. 5. The mixture I used over the whole field.

No. 6. Townsend's manure—a very good fertiliser, but a farmer can often manufacture a better and cheaper manure at home, as the results prove.

All the experiments after No. 6 were applied at the rate of 8 cwt. per acre, to test the qualities of superphosphate when used alone.

No. 7. Superphosphate manufactured by Messrs Maclaren, Leith, and supplied by Messrs Cunningham. This superphosphate had the highest analysis, from the very large per-centage of soluble phosphates, but it will be observed that the crop was the lightest; and I may mention a curious fact regarding this trial. In the month of August the crops after Nos. 8, 9, and 10, apppeared so unfavourable that I top-dressed them (leaving, of course, 50 yards of each experiment), as I thought I was going to lose the crop, while the appearance of No. 7 was so favourable that I did not top-dress it. The inference from this is, that the soluble phosphates nourished the plants up to this time, and then the deficiency of insoluble phosphates was felt afterwards. It is therefore quite possible that manufacturers may err in making too great a proportion of the phosphates soluble.

No. 8. Dissolved bones, manufactured by Mr Robertson, Dunbar.

No. 9. Bolivian guano. The results of this experiment show the superiority of guano to phosphates.

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* It must be kept in mind that the period of sowing, 2d June, is quite late enough for swedes; this, however, would have the effect of preventing them decaying.—Ed.

No. 10. Superphosphate—manufactured by Messrs Bell and Son, Leith.

No. 11. I made this mixture to try what could be done without Peruvian guano: the result is very favourable: its cost is little over £9 per ton, and gives a much larger crop than more expensive mixtures.

At this moment, notwithstanding all that science has done, Peruvian guano appears to be the best and cheapest artificial manure we can use. I hope the day is very distant when the supply will be exhausted, but it cannot always equal the increasing demand. When the day does come, I hope it may be the fortune of the farmer to have a cheap and good substitute at his command. And it is not only for the interest but the duty of farmers to give agricultural chemists every assistance in their power, by making repeated trials in exposition of their theories.

No.	Rate per Acre.		Cost.			Result.			
						Tons.	cwt.	st.	lb.
1.	6 cwt. Peruvian guano, ...		£3	18	0	22	18	4	12
2.	6 cwt. Phospho-Peruvian, ...		3	12	0	18	17	1	8
3.	2 cwt. Peruvian, ... 4 cwt. superphosphate,.........	6 cwt.	2	14	0	18	16	0	3
4.	4 cwt. Peruvian, ... 2 cwt. superphosphate,.........	6 cwt.	3	6	0	20	2	5	6
5.	1½ cwt. Peruvian guano, ... ½ cwt. sulphate of ammonia, 2 cwt. rape, ... 2 cwt. superphosphate, ...	6 cwt.	2	18	0	18	18	0	8
6.	6 cwt. Townsend's manure, ...		2	14	0	16	6	1	13
7.	8 cwt. Maclaren's superphosphate,......		2	16	0	15	6	0	4
8.	8 cwt. Robertson's dissolved bones,...		3	4	0	15	10	3	6
9.	8 cwt. Bolivian guano,.....................		2	16	0	16	8	0	0
10.	8 cwt. Bell's superphosphate,............		2	16	0	15	14	4	3
11.	2 cwt. sulphate of ammonia, 4 cwt. rape dust, ... 2 cwt. Bolivian guano, ...	8 cwt.	3	14	0	21	5	4	2

PROCEEDINGS IN THE LABORATORY.

By PROFESSOR ANDERSON, M.D., Chemist to the Society.

ON THE COMPOSITION OF THE DIFFERENT KINDS OF CONCENTRATED CATTLE-FOOD.

No one who examines the advertising columns of any agricultural periodical can fail to become familiar with the substances offered to the farmer, under the name of Concentrated Cattle-Foods, which are alleged by their manufacturers to be greatly preferable to the kinds of food in common use, and to present advantages which more than justify the high price at which they are sold. The promises held out by the makers of these foods are so extravagant, as to make it a matter of some surprise that the farmers of the present day should be found ready to use them; but it is clear, both from the extent to which they are advertised, and the increase in the number of manufacturers, that a very large sale must be found for them.

With the knowledge of these facts, and taking also into consideration the activity with which concentrated foods are forced upon the attention of the farmer, it appeared desirable to the Directors of the Highland and Agricultural Society that a series of analyses of these articles should be made for the benefit of its members, and with the view of ascertaining, first, whether their alleged high nutritive power had any foundation in fact; and, second, if so, whether any cheaper substitutes could be found for them. Means were accordingly taken for obtaining authentic samples of such of these substances as were known to us, and the results of their examination are contained in the following pages. Among them are believed to be samples of all the varieties generally advertised; and though some others of local celebrity may exist, they doubtless do not materially differ from those I have examined.* Before entering on details, it may be well to state that, both from the analysis of one kind of concentrated food, as well as from purely scientific considerations, I had long since made up my mind that these substances did not deserve the attention of the farmer; and so firm has been my conviction on this point, that though frequently applied to by manufacturers for analyses and opinions regarding their products, I have studiously avoided making analyses, and have distinctly expressed an unfavourable opinion of these substances; and my reason for adopting this course will be apparent from the sequel.

There is no doubt that the grounds on which the use of these concentrated foods has been recommended to the farmer are extremely plausible, and very likely to mislead the unwary, inas-

* Since this paper was written several new foods have appeared in the market.

much as he is led to believe that they are manufactured on scientific principles, and are the result of new and important discoveries. The very name applied to them is attractive, for the recent progress of agriculture has familiarised the farmer with concentrated manures, of which a few hundredweights are capable of replacing, more or less completely, many tons of ordinary farmyard manure; and he is thus easily led to believe that the concentrated foods bear to hay, straw, and turnips much the same relation that guano does to dung; that, in short, they contain only the nutritive elements of the food, all the non-nutritive substances which abound in the bulky natural foods having been removed. This view of the matter may not be asserted in so many words, but it is clearly implied both by the name "concentrated," so obviously borrowed from that used to describe manures, and by the statement that the contents of a small measure holding less than half a pint may be substituted for half the ordinary food of a horse or ox.

Before proceeding to the actual results of analysis, it may be well to inquire how far this alleged analogy between a manure and a food holds good. Experience has shown that the food of plants consists of a few simple compounds, of which ammonia, carbonic and phosphoric acid are examples, and these are found in ordinary manures in small quantity, and mixed with a large proportion of practically inert matters. Many of these substances also do not exist in the manure in the state in which they can be absorbed by the plant, but only in the form of complex compounds, from which they must be liberated by a series of chemical changes, frequently of a very complicated character, before they can become available to it; and this takes place so slowly that the plant food is often locked up and inaccessible for a very long period. It stands to reason, therefore, that if these changes can by any means be promoted, or the essential elements of the plant food be separated from the inert matters with which they are mixed or combined, and used alone, and in a directly available state, there should be obtained a concentrated substance capable of producing an effect equal to that of the more dilute mixture in common use. It is scarcely necessary to observe that experience has to a great extent confirmed this expectation, and that concentrated manures, in which the elements of the plant are found in easily accessible forms, have produced an entire revolution in the practice of agriculture. But when we turn from the food of plants to that of animals, and attempt to apply the same principles there, the analogy is found to fail entirely. Science has shown that a plant and an animal are composed of the same chemical elements; but while it has taught us that it is possible to extract these substances from the complex compounds in which they naturally exist, and to reduce them at once to those simpler forms of combination into which they slowly pass in the course of natural events, and to concentrate them for

the use of plants, it has also demonstrated, in the most incontestable manner, that those forms of combination which are useful to the members of the vegetable kingdom are not only useless, but often absolutely injurious to animals. Their functions are, in fact, diametrically opposed. Plants imbibe their food in the form of simple compounds, with which they build up the complex constituents of their tissues; while animals possess no such power, but require to have their food offered them in the form of complex and bulky compounds. They are incapable of converting the simple into the complex, and only store up within them, in slightly modified forms, substances which plants have built up from their simple elements; and in the very act of performing the functions which are necessary for the maintenance of life, these substances are destroyed, and revert again to the simple forms from which they originally sprung. A plant may therefore be looked upon as a piece of mechanism adapted to the construction, and an animal to the destruction, of organic compounds. And it is this important difference which lies at the root of the distinction between a manure and a food. A manure admits of concentration, because it is *possible*, although it may not be practically advantageous, to extract from it the simple compounds required for the food of plants; and any operation by which this is effected facilitates its action, because it accomplishes beforehand those changes which, under other circumstances, must be more slowly effected in the soil. But no such operation is possible with the food of an animal, which must of necessity retain its elements in the complex and bulky forms of sugar, albuminous compounds, and the like.

The difference may be very clearly illustrated by reference to rape-cake, which is employed both as manure and as a cattle food. Where it is to be used for the former purpose, it might suffice to extract from it the nitrogen it contains in the form of ammonia, of which it would yield about a hundredweight per ton, and its inorganic salts amounting to about the same quantity, and thus to concentrate it to about one-tenth of its bulk, with the prospect of obtaining a result somewhat similar to that produced by the entire substance.* But when it is to be used as a food this cannot be done. The nitrogen must remain in the form of albuminous compounds amounting to above 6 hundredweight per ton, and the mucilage and sugar which may be dispensed with in a manure, cannot be removed without affecting its nutritive value. Any concentration of which it is then capable must resolve itself into the removal of the innutritious matters, which are water and woody fibre. The former may of course be expelled by heat, but it is impossible to extract

* I do not, of course, enter here upon the consideration of the influence which the carbonaceous matters of rape-cake, when undergoing decomposition in the soil, may exert upon its disintegration, but look at it merely as a source of the food of plants.

the latter without occasioning such changes as to render the substance unfit for food. In the turnip, which contains, in round numbers, ninety per cent of moisture, great concentration is possible; for, of course, 10 tons might be reduced to one, and a well-known Scottish farmer, some ten or twelve years since, proposed to dry turnips artificially, and to preserve them in this way for use; but in the great majority of foods the moisture is too small to be of much importance, and, when expelled by heat, too easily reabsorbed from the air to give the process of drying any real value. If it were possible to extract the innutritious solids, some benefit might be obtained, but this is not practicable; and, moreover, it is only in straw and hay that the absolutely innutritious substances are found in any considerable quantity. In wheat-flour, for example, the quantity is perfectly trifling, as is shown by the following analysis:—

Water,	11.90
Oil,	1.01
Starch, &c.,	77.70
Albuminous compounds,	8.65
Woody fibre,	0.30
Ash,	0.44
	100.00
Nitrogen,	1.38

In this case the only substances entirely devoid of nutritive effect are water and woody fibre, amounting together to little more than twelve per cent; and hence it is *physically impossible* to obtain any greater amount of concentration of wheat-flour than to the extent of reducing 8 tons to about 7. It must be understood that wheat-flour is an extreme case, for had some other substances, such as oil-cake, &c., been selected, a greater, though still a comparatively small degree of concentration, would have been *theoretically* practicable. But only theoretically, because it is *practically* impossible, by any commercial or manufacturing process, to separate the nutritious from the innutritious elements of food. Even were it possible to do so, it is an open question whether the product would be such as would be suitable for the food of animals, for it is well known that the value of a food is dependent to a great extent on its physical properties, and on its condition being such as renders it fitted for maintaining the process of digestion. The more fully all these facts are considered, the more obvious does the difficulty of obtaining a concentrated food, in the same sense as that in which a concentrated manure is produced, become.

This difficulty has obviously made itself apparent to the manufacturers of concentrated food, because, of late, the ground on which they are recommended has been somewhat altered. They are now often called "condimental" foods, and are alleged to assist digestion, and, by promoting the more complete extraction of the

nutritive matters of the ordinary food, to effect a large economy. Specious as this view may appear, it will not bear the test of such experience as we possess. Anything which may be stated regarding the effect of condiments on cattle must be looked upon as mere assertion, and the only definite information in existence on this subject has been derived from the study of their action on man. The inference to be drawn from ascertained facts by no means leads to the idea that a condiment can be used to replace any part of the human food, or that it causes a more complete extraction of its nutritive matters. The contrary is rather the case, and it is probable that the ordinary condiments, such as spices, rather induce a larger consumption of food.

So far, then, as the statements regarding the concentration of food, by the removal of its innutritious part, go, it may be safely averred that this is practicable only to a very trifling extent, and certainly cannot be effected either by mechanical or chemical means with advantage to the farmer. The condimental effect of these substances is also a mere matter of statement, which is, up to the present time, unsupported by a shadow of proof. No doubt, abundance of "testimonials" in favour of these articles are published, but no one who knows the mode in which these documents are obtained can for a moment place confidence in them. Every quack medicine produces innumerable certificates of cures effected by it, often of diseases well known to be totally incurable; but, not to pass from agriculture, it may be stated that a manure of the most worthless description, and containing none of those substances which experience has shown to be required by the plant, is at the present moment sold throughout this country with the attestation of hundreds of practical farmers, although, when used by those who are known as careful experimenters, it always proves a failure.

Such being the *à priori* conclusions to which science leads, we now turn to the consideration of the composition of the different concentrated foods. The method of analysis adopted was substantially that in use for ordinary cattle-food, but in addition to the substances usually ascertained, the exact proportion of sugar was separately determined. For the satisfaction of chemists, it may be stated that this was done by extracting with cold water, and determining the sugar in the extract by Fehling's process, which was found to give satisfactory results. It has been stated that some of these foods contain antimony, and this substance was looked for very carefully, but its presence was not substantiated.

All these foods are mixtures of several different substances, of which some aromatic seed, such as fœnugrec, caraway, &c., form part; and an attempt was made to ascertain which of these substances had been used, by distilling with water a large quantity of the food, so as to obtain and examine the essential oil, and thus draw conclusions as to its nature. It was, however, found impossible to obtain

any results in this way, because the quantity of oil was so small, and the peculiar smell was so masked by the odorous principles which passed over along with it that it could not be recognised. A careful examination, however, of the food itself, enabled me to form some opinion as to the substances of which it is compounded.

Thorley's Cattle-Food.—The composition of this substance was as follows:—

Water,	11.41
Oil,	4.06
Albuminous compounds,	11.43
Sugar,	17.15
Starch, &c.,	46.90
Woody fibre,	6.22
Ash,	2.83
	100.00
Nitrogen,	1.82

The ash contains:—

Sand,	0.32
Phosphates,	0.51
Phosphoric acid in combination with the alkalies,	0.53

It consists of a rather coarsely ground powder, among which small grains of Indian-corn can be detected. The aromatic seems to be fœnugrec, but it is accompanied by a bitter substance, which is probably gentian.

Henri's Patent Cattle-Food Company.—Cow-food, price 30s. per cwt.:—

Water,	11.26
Oil,	6.22
Albuminous compounds,	12.87
Sugar,	9.05
Starch, &c.,	46.57
Woody fibre,	9.66
Ash,	4.37
	100.00
Nitrogen,	2.05

The ash contains:—

Sand,	1.72
Phosphates,	1.23
Phosphoric acid in combination with the alkalies,	0.64

This substance is much yellower than Thorley's, and its taste more bitter. In it particles of rice could be detected, and it also contains some oily seed.

Henri's Patent Cattle-Food Company.—Pig-meal, 24s. per cwt.:

Water,	10.22
Oil,	4.91
Albuminous compounds,	13.18
Sugar,	8.57
Starch, &c.,	45.98
Woody fibre,	13.39
Ash,	3.75
	100.00
Nitrogen,	2.10

The ash contains:—

Sand,	0.84
Phosphates,	0.42
Phosphoric acid in combination with the alkalies,	0.49

The pig-meal is completely identical in appearance, taste, and smell with the cow-food, and the chemical composition is also the same. The only difference is, that the former contains about a per cent less of oil, but in every other respect it is so completely similar that it may be safely averred that two samples taken from the same lot would show as great discrepancies as exist between these two analyses. They are clearly made from the same substances.

Gripper's Horse and Cattle Food, eighteen shillings per cwt.:—

Water,	10.90
Oil,	2.31
Albuminous compounds,	9.43
Sugar,	34.29
Starch, &c.,	33.29
Woody fibre,	6.35
Ash,	3.43
	100.00
Nitrogen,	1.50

The ash contains:—

Sand,	0.14
Phosphates,	0.44
Phosphoric acid in combination with the alkalies,	0.38

This substance differs from the preceding foods in the absence of the bitter matter, and the smaller proportion of aromatic seed, which, however, appears to be either fœnugrec or caraway. It is composed to a large extent of ground carob beans, the taste and peculiar smell of which can be readily distinguished. It also contains either rice or Indian-corn.

Gripper's Pig-Food, ten shillings per cwt.:—

Water,	9.28
Oil,	2.42
Albuminous compounds,	10.87
Sugar,	6.02
Starch, &c.,	43.55
Woody fibre,	24.09
Ash,	3.77
	100.00
Nitrogen,	1.73

The ash contains:—

Sand,	0.87
Phosphates,	0.26
Phosphoric acid in combination with the alkalies,	0.61

This food is almost devoid of taste, and appears to consist chiefly of some refuse matters from the mill, among which I believe rice-dust to be one. It contains no aromatic.

British Cattle-Food Company's Cattle Food :—

Water,	11.57
Oil,	6.92
Albuminous compounds,	16.68
Sugar,	14.85
Starch, &c.,	30.82
Woody fibre,	13.45
Ash,	5.71
	100.00
Nitrogen,	2.57

The ash contains :—

Sand,	0.89
Phosphates,	0.64
Phosphoric acid in combination with the alkalies,	0.84

This substance appears, as far as it is possible to judge, to be a mixture of linseed and carob bean, along with some other grain and an aromatic. There is no bitter substance.

Glasgow Cattle-Food Company.—

Water,	11.20
Oil,	4.71
Albuminous compounds,	9.25
Sugar,	25.35
Starch, &c.,	37.37
Woody fibre,	9.42
Ash,	2.78
	100.00
Nitrogen,	1.48

The ash contains :—

Sand,	0.30
Phosphates,	0.45
Phosphoric acid in combination with the alkalies,	1.10

The most noteworthy constituent of this food is turmeric, of which it apparently contains a considerable quantity. The other substances do not appear to differ much from those of the rest of the foods analysed.

The examination of these analyses shows that there is a very close general resemblance among the samples. Whatever difference may exist in the nature of the ingredients or the proportion in which they are mixed, there is but little in their nutritive value. They are, in fact, all composed of ordinary feeding grains, with the addition of certain aromatic or bitter substances, forming but a small proportion of the whole. The methods of chemical analysis which enable us to state how much sugar or albuminous compounds any mixture may contain, do not admit of our determining the proportions of the various seeds or other substances mixed together; nor is this a matter of any moment as far as nutritive value is concerned, for it is immaterial whether these particular elements are derived from one or other grain. It is their combined effect which is of importance. Looking, therefore, at these foods merely in a nutritive point

of view, it must be unhesitatingly asserted that they have nothing to recommend them. They are, in fact, inferior in this respect to many of the simple foods in common use—such, for example, as linseed or oil-cake. Neither have they any claim to be considered as "concentrated" foods in the sense in which we speak of a concentrated manure. There has been no removal of the innutritious matter, the water being nearly the same as in most seeds, and the woody fibre exceeding in amount that found in the common grains or in oil-cake. Nor can this excite any surprise, for they are all mixtures of those substances with aromatic seeds or roots, which are all much richer in woody fibre than the nutritive grains.

The presence of aromatic or bitter matters is, therefore, the sole peculiarity of these cattle-foods; and it is obvious that these substances ought to produce any effect of which they are capable, just as well if they be added to the ordinary food of the cattle, as if they be mixed by a manufacturer with other substances before being sold to the farmer.

It has been already remarked that the effect attributed to aromatics by the makers of these foods is in the last degree problematical, and unsupported by any well-ascertained facts; and their assertions must go for nothing, unless they are prepared to support them by experiments which shall be satisfactory to experienced feeders. As matters at present stand, they must be judged of on the same principles as those used in estimating any other food, and in this respect they cannot be ranked very high. If they possess any special action, it is self-evident that it must belong to the aromatic or the bitter substances they contain; and if the makers wish to satisfy the farmer on these points, they ought to put it in his power to use the aromatics alone, and allow him to mix them with such foods as he may choose. This course, however, will by no means suit their purpose. At present they take carob beans, Indian-corn, and other substances, costing £8 or £9 per ton, which are mixed with a small quantity, about ten per cent, of some aromatic costing perhaps £20 to £25 per ton, and the mixture so produced, at a cost of perhaps £10 or £11 per ton, is sold to the farmer at £30. It is quite obvious that, so long as a manufacturer can sell the article he produces at a price approaching three times its intrinsic value, he will not trouble himself to inquire into the exact facts of the case, and will be satisfied with denying, in place of refuting, the statements of scientific men. The opinions I have expressed regarding these feeding-stuffs are in complete harmony with those entertained by all agricultural chemists. They have already been often expressed, and their accuracy strenuously denied by the concentrated-food makers, and they will no doubt be again denied, but they will not be disproved by them. If the manufacturers really desire to satisfy the agricultural community, the proper course would be for them to submit their foods to

some farmers of experience, in whose judgment full confidence can be placed, and agree to stand or fall by the result. From this ordeal they will doubtless shrink, and as long as they do so, they must be content to bear the imputation of trading on the credulity of the farmer, and selling him an article at three times its real value.

I have not hesitated to express thus distinctly the opinions I entertain, because this is a subject on which science can speak with no doubtful voice. It is not a question in regard to which there can be any difficulties, but is one of comparing the results of analyses with those of other and well-known foods; and before a minute examination the alleged "discoveries" of the inventors of these substances vanish into thin air, or rather resolve themselves into the art of making the farmer pay dear for a cheap article.

ON THE COMPOSITION OF SOILS UNDERLYING PEAT-MOSS.

The origin of peat-bogs is in all respects a very interesting question, and one of those which have a greater bearing on practical agriculture than might, at first sight, be supposed. They afford evidence of a remarkable change occurring in the condition of the surface; for many of them are found lying upon soils which, so far as their general appearance is concerned, are quite unexceptionable, and have obviously at some remote period maintained an abundant vegetation; for they contain embedded in them the roots of trees of great magnitude, often exceeding in size those occurring at the present time in the most favoured spots of the surrounding district. These trees have obviously reached a healthy maturity in a congenial soil, and then a change has taken place which has rendered it unfavourable to forest trees, and promoted the growth of moss plants. It is clear also that this change must have been rapid, for the trees have certainly not undergone a slow destruction, but have been overtaken in the full vigour of their growth, and quickly embedded in the moss which was gathered around them. The proof of this is to be found in the entire absence of decay in these trees; for their wood, though blackened by substances derived from the peat, is in general perfectly sound, and fitted for all the ordinary uses of timber. There is no reason to suppose that the production of moss is in the least degree dependent on deterioration of the soil; on the contrary, it is due to some changes by which the drainage of the district has been disturbed, the escape of water prevented, and the growth of those plants which luxuriate in moisture promoted.

Although this is an inference which may be fairly drawn from studying the position in which peat-bogs are found, it is to a certain extent an assumption, as I am not aware that the soils lying beneath bogs have been analysed; but the subject is worthy of examination, because experience has shown that it is in most cases

almost impracticable to reclaim deep peats in a satisfactory manner without the addition of some clay soil, and very often the only place where the requisite material can be found is under the moss itself. At other times, the choice between a clay lying in the immediate neighbourhood and that under the bog, may be decided by the superiority of the one over the other as a soil.

The consideration of these points leads me to avail myself of the opportunity of examining some soils lying under the peat-moss at Dargavel, and which have been uncovered in the course of some operations for reclaiming a part of it. They were the more interesting, inasmuch as they form the soil in which oaks of great size grew, and in which their roots were found. Many of these trees were 4 or 5 feet in diameter; and the trunk of one 50 feet in length, without a branch, was found in the peat. The moss under which these soils are found was of great extent, and at one time stretched for some miles over the low ground of Renfrewshire from Houston to Bishoptown, and even farther west. A great part of this moss has at different times been reclaimed, and the late Mr Fleming of Barochan devoted much attention to the best way of bringing it in. The general conclusion to be drawn from all the trials which have been made is, that though by trenching, exposure to the air, and the use of lime, the moss itself can be brought in and made to yield good crops for some years, its permanent amelioration cannot be satisfactorily effected without the addition of some mineral matter. The soils and subsoils analysed were found lying under 10 or 12 feet of moss, and may be described as rather stiff clays. The process of analysis followed was that described in my paper on the wheat soils of Scotland, published in the Transactions of the Society some years since, with this exception, that the substances soluble in water were not separately determined. This part of the analysis was omitted, because recent observations regarding the absorptive power of the soil have shown that it is of little practical value, while the experiments by which they are ascertained are very laborious, and occupy much time.

No. 1.—*Soil in immediate contact with the Peat.*

Water,		6.90
Organic matter,		14.60
Soluble in Acids.		
Alumina,	6.06	
Peroxide of iron,	2.78	
Lime,	0.25	
Magnesia,	0.12	
Potash,	0.22	
Soda,	0.23	
Sulphuric acid,	0.05	
Phosphoric acid,	trace	
Chlorine,	0.01	
Soluble silica,	trace	
Total soluble in acids,		9.72

Insoluble in acids—		
Alumina,	13.97	
Peroxide of iron,	1.04	
Lime,	0.40	
Magnesia,	trace	
Silica,	53.42	
Total insoluble in acids,		68.83
		100.05

This soil, which formed the 10 inches immediately below the peat, contained a considerable quantity of organic matter, which, from the smell it evolved in burning, was obviously of a peaty nature, and had unquestionably found its way into it from the moss. In other respects the soil is distinguished by the very small quantity of the elements required by plants which it contains. Thus, of phosphoric acid and soluble silica it contains only a trace, while the sum of all the other inorganic constituents of plants amounts in the portions soluble in acids to no more than 0.78 per cent of its weight, and in the insoluble portion there is just 0.4 of lime. It must, therefore, be considered a poor soil, and exhausted of some of its most essential ingredients; and this fact seems at first sight incompatible with the luxuriant growth of the trees found in it. We shall afterwards, however, see reason to doubt whether it was in this state when the trees grew upon it, and to believe that the exhaustion is due to the growth of the overlying peat.

No. 2.—Soil free from Moss.

Water,		6.22
Organic matter,		15.57
Soluble in Acids—		
Alumina,	9.08	
Peroxide of iron,	1.96	
Lime,	0.25	
Magnesia,	0.15	
Potash,	0.25	
Soda,	0.20	
Sulphuric acid,	trace	
Phosphoric acid,	0.05	
Chlorine,	trace	
Soluble silica,	0.60	
Total soluble in acids,		12.64
Insoluble in Acids—		
Alumina,	8.51	
Peroxide of iron,	1.31	
Lime,	0.89	
Magnesia,	0.86	
Phosphoric acid,	0.09	
Silica,	53.63	
Total insoluble in acids,		65.29
		99.72

This soil differed from the first in being taken a little lower, so that there might not be the least trace of moss adhering to it. But, notwithstanding this, it contains a somewhat larger quantity of organic matter, which, like that contained in No. 1, was thoroughly peaty in its character. Either, then, this organic matter had infiltrated from the peat, or, what is more probable, the upper portion of the soil had been deposited from water just at the time the moss was in process of formation. We may easily imagine that the surface was frequently overflowed at the time of floods, and that the water deposited a quantity of clay, which it carried along in suspension; that as the water slowly drained off or evaporated, a crop of moss plants sprang up, and by the frequent repetition of these changes, a deposit, rich in organic matter, was produced. It is interesting to observe that the clay so deposited must have been very pure, and remarkably devoid of those substances required to maintain the life of plants. In fact, the sum of the lime, magnesia, potash, soda, and phosphoric acid, is just 1 per cent; and if we assume the 15 per cent of organic matter to be the remains of moss plants, this amount of mineral substances would be no more than sufficient for the plants, for mosses contain in general about 6 per cent of ash. In the absence, therefore, of these remains, the clay would possess but little fertility.

No. 3.—Subsoil of No. 2.

Water,		2.17
Organic matter,		11.57
Soluble in Acids—		
Alumina,	7.59	
Peroxide of iron,	1.92	
Protoxide of iron,	2.14	
Lime,	0.27	
Magnesia,	0.17	
Potash,	0.88	
Soda,	1.80	
Sulphuric acid,	trace	
Phosphoric acid,	0.12	
Chlorine,	trace	
Soluble silica,	0.15	
Total soluble in acids,		15.04
Insoluble in Acids—		
Alumina,	12.15	
Peroxide of iron,	0.68	
Lime,	0.24	
Magnesia,	1.34	
Potash and soda,	0.05	
Silica,	56.46	
Total insoluble in acids,		71.12
		99.90

The contrast between this subsoil and the two samples of the soil

itself, is sufficiently remarkable. Though still containing a large quantity of organic matter, it is much richer in all the essential constituents of plants. The quantity of alkalis is especially large; and if it were not for the almost complete absence of sulphuric acid and chlorine, it might be described as a good soil. It is fair, however, to observe that many excellent soils are very deficient in these two substances, which are not retained by the soil as the other inorganic elements of plants are. It is not a usual circumstance to find a subsoil superior to a soil, although no doubt cases of the kind do occur; and there are two different modes of explaining the phenomenon in this case, to which reference will be afterwards made.

No. 4.—*Stiff Clay underlying Peat.*

Water,		4.36
Organic matter,		8.06
Soluble in Acids—		
Alumina,	11.57	
Peroxide of iron,	0.84	
Lime,	0.39	
Magnesia,	0.16	
Potash,	0.48	
Soda,	0.44	
Sulphuric acid,	trace	
Phosphoric acid,	0.02	
Chlorine,	0.01	
Soluble silica,	0.79	
Total soluble in acids,		14.50
Insoluble in Acids—		
Alumina,	19.21	
Peroxide of iron,	1.58	
Lime,	1.12	
Magnesia,	0.79	
Phosphoric acid,	0.04	
Manganese,	trace	
Silica,	50.43	
Total insoluble in acids,		73.17
		100.09

In this case the greater stiffness of the clay depends upon the very large quantity of alumina which is present, amounting in all, and including that found in both the soluble and insoluble part, to more than 30 per cent. In other respects it may be said to agree generally with the others, excepting that the organic matter is considerably lower and the lime higher.

These analyses offer many points for consideration which are worthy of notice in relation to the origin of soils; for they represent the virgin soils of a fertile district unaffected by those varied changes produced by a long period of cultivation. The superiority of the subsoil has already been adverted to as a remarkable circumstance, and in cultivated soils is very unusual. The truth is, that the soil may be most correctly distinguished from the subsoil by describing it as that portion of the surface which has become charged with the

remains of the crops growing upon it. Hence it happens that, when a soil has for a long period maintained a certain amount of vegetation without removal of the produce, as it must do in a state of nature, there is of necessity an accumulation of organic matters, and of the mineral substances found in plants; while the subsoil contains none of these substances, or at best only that small proportion which is due to the penetration of the deeper-rooted plants. The case now before us offers a marked exception to this rule, and it may be explained in one of two ways. It may be supposed that what has here been called the soil may be a deposit from water, consisting in great part of clay produced by the disintegration of rocks nearly or altogether devoid of vegetation, and in that case the stratum below it is the true soil, containing abundance of the mineral constituents of plants in which the roots of the trees were really fixed, and from which they derived their nutriment. On the other hand, it may also be supposed that the soil immediately in contact with the moss has been deprived of the more important plant-food by the mass of peat lying above it. It will be readily understood that the condition of an ordinary soil is very different from that of one on which peat has been formed. The remains of plants in the former case constitute but a small proportion of the soil, while in a peat-moss they greatly exceed its own weight. What happens, therefore, when peat is being produced, is somewhat of this kind: A crop of moss-plants makes its appearance, and takes from the soil a certain quantity of its inorganic matters, which is not returned to it because the plants do not decay, but remain in the form of peat. The next crop, sending its roots down in search of food, withdraws another supply, and thus at length the greater part of the mineral food originally existing in the soil is carried up into the superincumbent mass of peat, where it is accumulated; and in the course of those more tardy changes which the vegetable matter there undergoes, affords a supply of inorganic substances to new crops of plants. It is, of course, impossible to say which of these explanations is the correct one, but probably both causes may operate to a certain extent. This much is certain, that No. 3, which is here called the subsoil, is of very good quality, and contains all that plants require for their healthy growth.

In deciding which of the soils now analysed is to be considered most suitable for mixing with the peat in the process of reclamation, there can be little doubt about giving the preference to No. 3; for though the peat itself unquestionably contains a large quantity of the mineral matters required by the crop, they are not in a very accessible form, and only become available as the decompositions produced by the air and by the action of lime, which are requisite on the reclamation of peat, advance. Practically, the use of the subsoil must be limited by the necessity of first excavating the

portion which lies above it; but there is no reason for rejecting this, because, though inferior to the others, its qualities are such as enable it to produce a very material amelioration of the peat. Indeed, a great part of the influence which clay and gravel exercise in the improvement of peat is of a mechanical kind. They diminish its objectionable porosity, enable it to support the roots of plants in a more satisfactory manner, and cause it to retain the manures added. There is scarcely any mineral matter which will not improve peat in this way, although, of course, other things being alike, a preference will undoubtedly be given to that which is otherwise the best.

In connection with these analyses, it seemed to be of interest to examine the wood of the large oaks imbedded in the peat, and, which, so far as I am aware, has never been submitted to analysis. The wood examined was almost black, and when dried had a peculiar bluish shade. When burned, it left a light porous ash, coloured brown by oxide of iron.

The wood contained:—

Carbon,	50.09	Oxygen,	30.59
Hydrogen,	6.33	Ash,	12.34
Nitrogen,	0.65		100.00

The composition of the ash was:—

Protoxide of iron,	14.03	Sulphuric acid,	1.13
Peroxide of iron,	61.71	Phosphoric acid,	0.68
Lime,	3.94	Soluble silica,	0.12
Magnesia,	1.98	Sand,	1.03
Potash,	1.15	Charcoal,	11.55
Soda,	2.46		99.78

These results, calculated after deduction of sand and charcoal, give:—

Protoxide of iron,	16.11	Soda,	2.82
Peroxide of iron,	70.78	Sulphuric acid,	1.29
Lime,	4.51	Phosphoric acid,	0.77
Magnesia,	2.27	Soluble silica,	0.14
Potash,	1.31		100.00

The composition of this ash is very remarkable, and entirely different from that of recent trees. I have not been able to find on record any analysis of the ash of recent oak, but that of other woods, which are all very similar, contain only a small quantity, generally under a per cent of peroxide of iron, and are rich in potash, lime, and phosphoric acid. In the bog oak ash these substances are present in but small quantity, while iron in the form of its two oxides is the chief constituent. It contains in these forms no less than 62 per cent of metallic iron, so that it is actually richer in metal than the majority of iron ores. It is obvious that the iron must have been imbibed from the peat, and its combination

with the tannic and gallic acids existing in the wood is the cause of the dark colour it has acquired.

In the article on "Early planting in Scotland," which was published in the Transactions in July, Mr Cosmo Innes observes that "the trees found in peat mosses—for the most part few and small, and confined to a narrow space—are surely very far from proving that large tracts of the country were covered with close forest." Without presuming to discuss this question, I may observe, that the operations on the Renfrewshire mosses have revealed the remains of timber neither "few nor small." The following memorandum has been obtained from Mr Speir of Blackstone, a gentleman distinguished by the extent of his moss reclamations:—

"The removal of the entire deposit in some instances, and in others the deep cuttings required to secure sufficient drainage for cultivating the moss on the surface, have afforded abundant evidence that its original site throughout its whole extent was, at one period more or less remote, covered by a magnificent oak and pine forest. The strata, which rests immediately above the alluvial clay, is composed of rotten birch, alder, hazel, and other forest debris; and imbedded in this are found the roots of oaks and pines, standing more or less apart according to the size of the trees, in the same upright position in which they grew, and with one or two feet of the stem still remaining; also fallen oak and pine stems of different dimensions, with and without the upper portion of their roots attached, and which doubtless have been prostrated by heavy gales. The largest of these fallen oaks which I have disinterred, measured 43 feet in length, and averaged 3 feet in diameter for 14 feet above the root. The oak and pine are the only description of timber found in a state of preservation, and the latter is not only confined to a particular district of the moss, but is not so frequently met with as the former. In no instances have either my workmen or myself discovered any trace of fire, or of the use of an axe upon any of those fallen trees."

My own observation at Dargavel corroborates Mr Speir's experience. During last summer Mr Hall Maxwell had, in the course of his improvements, to trench a few acres from which a great depth of peat had been previously removed for fuel. Before reaching the clay, a layer of birch and hazel debris was passed, the woody fibre reduced to a pulp, but kept unaltered in shape and size by the bark, which was bright and sound as that of a living tree. Immediately beneath this was found the soil, the subject of No. 1 of the foregoing analyses, and, imbedded in it, were oaks, in such profusion and of so great a size, as to make the improvement a very costly one, on account of the labour expended on their removal. I observed the remains of one noble tree; it was in an advanced stage of decay, and must have lost much of its original grandeur; still, its stump was above 20 feet in circumference, and part of the stem lying beside it exceeded 5 feet in diameter. Many of the others had a diameter of from 3 to above 4 feet, and I noticed one, showing that size over a clean stem, 49 feet long. The oaks in this moss are generally sound, and have been used by the proprietor as material for furniture. As in the adjoining island of peat at Blackstone, there is no trace of fire or of axe, nor any indication that either man or beast existed when these buried trees flourished.

ABSTRACT of the ACCOUNTS of the HIGHLAND
(The detailed Accounts will be submitted, in terms

CHARGE.

1. Balance in the Royal Bank of Scotland at 30th Nov. 1860,			£1895 19 4
2. Medals on hand at do., ...			50 13 0
3. Arrears of Subscriptions at do., . .		£321 16 0	
Less written off as irrecoverable, .	£83 7 6		
Extinguished by Life Compositions,	26 14 6		
		110 2 0	
			211 14 0
4. Interest on £9500 Heritable Security, . .		£342 7 1	
5. Dividends on £20,886, 8s. 7d. Bank Stock, .		882 10 1	
6. Dividends on £6570 Debentures, . .		263 7 7	
7. Dividend from British Fishery Society, .		20 0 0	
8. Progressive Interest on Bank Account, .		27 5 8	
			1535 10 5
9. Annual Subscriptions, ...			880 16 0
10. Life Subscriptions, ...			950 13 6
11. Subscriptions in aid of Local Competitions, . . .			99 0 0
12. CHEMICAL DEPARTMENT—			
1. Balance in Royal Bank at 30th Nov. 1860,		£3 1 8	
2. Annual Subscriptions, ...		139 17 6	
3. Progressive Interest on Bank Account, .		1 17 1	
			144 16 3
13. DUMFRIES SHOW, 1860—Receipts per Abstract, . .			2682 8 8
14. ABERDEEN and EDINBURGH SHOWS—outstanding Entry Money, &c.,			3 10 0
			£8455 1 2

and Agricultural Society, for the Year 1860-61.
of the Charter, to the General Meeting on 15th January 1862.)

Discharge.

1. Establishment Expenses—							
1. Secretary's Salary,	£500	0	0				
2. Allowance for Heating, Cleaning, Service, &c.,	83	5	0				
3. Auditor's Fee,	30	0	0				
4. Salary to Editor of Transactions,	42	0	0				
5. Clerks' Salaries,	179	3	6				
6. Allowance to Curator of Machinery,	10	0	0				
7. Feu-duties, Taxes, Repairs, &c., Albyn Place,	142	15	1				
				£987	3	7	
2. Chemical Department—							
1. Chemist's Salary,	£300	0	0				
2. Balance in Royal Bank, 30th November 1861,	1	18	9				
				301	18	9	
3. Veterinary Department—							
1. Allowance to Professor Dick,	£26	5	0				
2. Medals to Students,	5	12	0				
3. Advertising,	6	19	6				
				38	16	6	
4. Museum—							
1. Expense of Alterations,	£531	6	9				
2. Feu-duty, Taxes, &c.,	74	16	6				
3. Porter's Wages and Livery,	32	0	0				
				638	3	3	
5. Premiums—							
1. Premiums for years prior to 1860,	£91	10	0				
2. Premiums for Reports 1860,	102	6	0				
3. Premiums for Dumfries Show, 1860,	1325	3	3				
4. Premiums for Local Competitions, 1860,	691	16	9				
				2210	16	0	
6. Printing,				152	17	3	
7. Stationery,				15	0	0	
8. Advertising,				26	2	11	
9. Postages and Carriages,				57	0	0	
10. Miscellaneous Expenditure—							
1. Mr Russell, for Report of Perth Show,	£12	12	0				
2. Substances for analyses in Laboratory,	8	3	0				
3. Portrait of Clydesdale Mare,	26	0	0				
4. Travelling Expenses,	8	15	4				
5. Meteorological Society Subscription,	5	0	0				
6. Reporting General Meetings,	3	8	0				
7. Bank Charges and Stamps,	5	0	7				
8. Incidental Expenses,	7	4	8				
				76	3	7	
11. Dumfries Show, 1860,—General Expenses, per Abstract,				1942	15	0	
12. Balance on Bank Account at 30th Nov. 1861,				1665	17	4	
13. Medals on hand at do.				31	7	6	
14. Arrears of Subscriptions at do.,				310	19	6	
				£8455	1	2	

Edinburgh, 18*th December* 1861.

T. GLADSTONE, } *Members of*
JAMES W. HUNTER, } *Finance Committee.*
ARCHD. HORNE, *Auditor.*

DUMFRIES SHOW, 1860.

(The detailed Accounts will be submitted

RECEIPTS.

1. LOCAL SUBSCRIPTIONS—		
1. Contribution by Town of Dumfries, . .	£50 0 0	
2. Contribution by Proprietors in County of Dumfries, ...	374 17 4	
3. Contribution by Proprietors in Stewarty of Kirkcudbright, ...	246 0 0	
4. Contribution by Proprietors in County of Wigtown, ...	179 0 0	
5. Contribution by Tenant Farmers in the three Counties, ...	98 16 3	
6. Contribution by Glenkens Agricultural Society,	5 0 0	
		£953 13 7
2. AMOUNT COLLECTED IN SHOW-YARD—		
1. Drawn at Gates, ...	£1086 10 6	
2. Drawn at Trial of Implements, . .	29 11 2	
3. Drawn at Trial of Reaping-Machines, .	7 17 0	
4. Farm-servants' Tickets, . . .	11 12 0	
5. Catalogues and Awards sold, . . .	140 0 6	
		1275 11 2
3. ENTRY-MONEY—		
1. On Stock, ...	£78 0 10	
2. On Implements, ...	66 1 0	
		144 1 10
4. Rent of Stalls in Show-yard, ...		243 8 2
5. Rent of Refreshment Booth, ...		45 0 0
6. Interest from Banks, ...		10 13 11
7. Lord Ashburton's Premium for Cart Drag, . . .		10 0 0
		£2682 8 8
8. Balance, ...		585 9 7
		£3267 18 3

Abstract of Accounts.

to the General Meeting on 15th January 1862.)

PAYMENTS.

1. PREMIUMS drawn at 30th November 1861,					£1325	3	3
2. SHOW-YARD—							
1. Contractor for fitting up Show-yard,	£1050	15	6				
2. Payment to Tenant of field,	40	0	0				
3. Bedding for Stock,	56	7	10				
4. Water supply,	33	2	0				
5. Refreshments for Judges and Committee in Yard,	19	6	9				
6. Omnibus and Cabs for Judges,	3	4	6				
7. Conveyance of Poultry Coops,	3	3	0				
8. Militia Band,	1	17	6				
					1207	17	1
3. TRIAL OF IMPLEMENTS—							
1. Use of Ground and Damage to Crop at Lincluden,	£34	8	0				
2. Cartage of Implements,	2	0	0				
3. Keep of Ploughmen and Horses,	6	10	6				
4. Grain for Thrashing-Machines	9	10	0				
5. Roots for Cutters,	4	10	0				
6. Coals,	2	2	9				
7. Labourers and Workmen,	2	10	0				
					61	11	3
4. POLICE FORCE,					58	15	5
5. TRAVELLING EXPENSES of Judges, Staff, Secretary, Clerks, &c.,					79	14	4
6. HOTEL BILLS for ditto,					129	9	2
7. TICKETS TO BANQUET for ditto,					16	2	6
8. LOSS UPON BANQUET,					19	12	0
9. PRINTING—							
1. Catalogues,	£98	0	0				
2. List of Awards,	13	5	0				
3. Bills and Placards,	21	10	6				
4. Premium Lists, Certificates, Circulars, &c.,	36	7	0				
					169	2	6
10. ADVERTISING—							
1. At Railway Stations,	£20	0	0				
2. In Newspapers,	41	16	1				
					61	16	1
11. TRIAL OF REAPING-MACHINES, 1st September—							
1. Travelling Expenses of Judges, Secretary, &c.,	£9	0	11				
2. Hotel Bills for ditto,	3	12	4				
3. Medium Gold Medal awarded to Tenant of field,	6	2	0				
4. Workmen engaged at trial,	2	0	0				
					20	15	3
12. Allowance to Local Secretary,					21	0	0
13. Outlay by him,					6	2	9
14. Allowance to Curator of Machinery,					8	0	0
15. Ditto to Bank Collector,					5	6	2
16. Clerks,					28	10	0
17. Assistants, Porters, and Labourers,					10	14	0
18. Postages,					28	18	3
19. Stationery,					3	17	0
20. Miscellaneous Expenditure,					5	11	3
					£3267	18	3

EDINBURGH, 18*th Dec.* 1861.

T. GLADSTONE, } *Members of*
JAMES W. HUNTER, } *Finance Committee.*
ARCHD. HORNE, *Auditor.*

State of the Funds of the Highland and Agricultural Society,

At 30*th November* 1861.

I. Investments—							
1. Heritable Bond,				£9,500	0	0
2. Bank Stocks, present value,				20,886	8	7
3. Railway Debentures,				4,570	0	0
4. Glasgow Water Corporation Debenture,				2,000	0	0
5. Ten Shares, or £500, of the British Fishery,				200	0	0
				£37,156	8	7
II. Heritable Property, per Valuation,				7,487	18	5
III. Fluctuating Balances—						
1. Balances in Royal Bank,	£1667	16	1			
2. Medals on hand,	31	7	4			
3. Arrears considered recoverable,	249	14	6			
				1,948	17	11
				£46,593	4	11

Abstract of the Accounts of the Argyll Naval Fund for 1861.

Charge.				Discharge.			
1. Balance in the Royal Bank of Scotland at 30th November 1860,	£324	8	9	1. Allowance to two Recipients,	£80	0	0
2. Interest on £3000 Heritable Security,	108	2	3	2. Balance in Royal Bank at 30th November 1861,	426	8	10
3. Dividends on £1700 Debenture,	65	6	4				
4. Progressive Interest on Bank Account,	8	11	6				
	£506	8	10		£506	8	10

Edinburgh, 18*th Dec.* 1861.

ARCHD. HORNE, *Auditor.*

GRASS WITH OR WITHOUT A CROP.

By JAMES SANDERSON, 13 Cannon Row, London.

[Premium—The Gold Medal.]

To no department of agriculture has the Scottish farmer devoted so little attention, considering its importance, as the cultivation of grass for pasture. Even in our present advanced stage of agricultural knowledge, there are few, if any, farmers who have practically tested the comparative value of different grasses for sheep-pasture. In regard to cereals, the farmer has employed every means he can command to ascertain the varieties best suited to different soils and climates, and which yield the greatest amount of produce; and his efforts have not been fruitless, but have led to the introduction of improved varieties of all kinds of grain. It is otherwise with grasses; the same mixture of seeds, in a great measure, is used now as was used fifty years ago. No new variety of grass for pasture has been introduced, and there are no reliable data—the results of experimental researches—to guide the farmer in choosing one variety more than another. Half a century has wellnigh passed away since George Sinclair thus wrote: "Out of 215 distinct species of grasses which are capable of being cultivated in this climate, two only have been cultivated to any extent." This is strictly true, even up till the present time; indeed it may be said that only one variety of grass is now used for pasture, as there is scarcely a farmer who departs from the usual custom of seeding with ryegrass. Like many other rigid observances of long-prevalent customs, which owe their existence more to precedence than profit, more to rule than right, this retention of an old custom may be ascribed to habit rather than to choice. There are doubtless many difficulties in the way to impede the acquiring of a correct knowledge of the value of grasses for pasture. Unlike the testing of cereals, or of meadow-grasses—merely performed by weighing the yield, and often executed on a few square yards of land—a knowledge of the nutritive value of pasture-grasses can only be acquired by slow and accurate experiments conducted on a considerable area of land. The grasses must be sown separately in separate fields, of similar soil and condition, and the progress of, and results obtained from, the respective lots of sheep and cattle which depasture them, carefully ascertained. If several experiments were conducted in this manner in different districts, I believe that the benefits to agriculture which would accrue therefrom would be incalculable.

As regards natural meadow-grasses, or artificial grasses for hay, their habits are better known, and their nutritive qualities better

understood. The researches of Sinclair, Parnell, Way, Lawes, and Voëlcker, have brought to light many facts which may safely guide the farmer in this department. These researches, however, are happily becoming of less importance, as the growth of meadow hay in all well-farmed districts is gradually diminishing, and as artificial hay should seldom be used excepting for seed or for home consumption.

To discover the true value of pasture-grasses, I apprehend the farmer must draw on his own resources, and not merely depend on the teachings of analytical chemistry. Here, as in every other field, experience is a safe and an unerring guide, and if it does not reveal causes, it leads to the obtaining of important results. Science may ascertain, as it has ascertained, the qualities of different grasses in a natural and in a dried state; but as yet it has not told the comparative qualities of different grasses in an infant state of foliage. Doubtless an analysis of grasses in a matured state would show a different result from that of grasses in their first stage. Every practical farmer is cognisant of the fact, that on some soils grasses eaten close to the ground—so close, indeed, as to expose the naked roots—conduce more to the rapid fattening of lambs following their mothers than grasses with more luxuriant foliage. This may appear anomalous, and may be difficult to account for, but it is nevertheless accredited by experience.

Apart from the investigations of science, which have shown that there are more valuable grasses than ryegrass for hay, the practical farmer may discover in this variety habits which render its cultivation open to serious objections either for pasture or hay. From its shallow and tiny roots ryegrass is easily injured by extremes of cold or heat, dry or wet weather. The rapidity, too, with which it rushes into seed in forcing weather, deteriorates its value as pasture, as well as deteriorates the soil on which it grows. So also ryegrass for hay. It extracts from the soil valuable ingredients; and as it feeds on the same food as the wheat plant, it is very damaging to a succeeding crop of wheat. The exclusive use of ryegrass, therefore, either for hay or pasture, although universal, is not commendable, and the introduction of some other varieties, such as crested wagtail, cocksfoot, &c., might be followed with important results.

Although little or no progress has been made for a long period in the introduction of any new variety of grass for pastures, yet it must be admitted that, as regards the *mechanical* department of the cultivation of grasses, great improvements have been recently introduced. The substitution of machine for hand sowing, of light for heavy harrows, a finer surface-tilth, the compression of the surface-soil by rolling, and the use of a less quantity of cereal seed, have all greatly conduced to the improving of artificial pastures. This department of agriculture, however, still demands increasing attention, and affords room for further improvement; for grass,

whether viewed as essential in a rotation, to impart fertility to the soil, or as the medium through which the combination of stock and crop husbandry—the most successful of all farming—can only be carried out, is one of the most important farm-crops.

Even up till the end of last century, the mode of grass-culture was exceedingly primitive. It was the prevailing practice for farmers to sow no grass-seeds, but after the land was exhausted by severe cereal cropping, it was left to seed itself with worthless plants inherent to it, and with the seeds of weeds carried by winds from neighbouring fields. There are farmers in England at the present time who adopt a similar course, and who even maintain that they eventually secure the thickest meadow-sward in this way. Such a practice, however, cannot be too much condemned, as it only fosters the growth of docks, thistles, and all noxious weeds, and is the offspring of exhausted soils and impoverished tenants.

The method of sowing grass-seeds with a grain crop has been long adopted in all well-farmed districts. When the four-course system was practised, and grass invariably cut for hay, it was essential to sow both crops together, or otherwise lose a white crop. To have dispensed with a white crop in a four-course rotation would have been, under the then circumstances, unwise, and would have deranged the general system of management. It would have provided for the maintenance of fewer stock, and therefore less manure would have been produced to keep the soil fertile. The four-course system, however, though the most perfect mode of alternating exhausting and fertilising crops that could be devised, proved defective for the successful cultivation of turnips and clover—has been almost entirely abandoned, and a rotation which requires the less frequent recurrence of these crops adopted. With the extended as with the four-course rotation, grass-seeds are sown with a cereal crop, and the practice is equally commendable. As grasses are not perfected for pasture the season in which they are sown, so the sowing of them with a grain crop effects in one year what otherwise would require two years to accomplish. Doubtless the conjunction of the two crops is under certain conditions reciprocally injurious; but, on the whole, under a systematic course of cropping, the disadvantages arising therefrom are trifling compared with the advantages. The chief advantage of sowing the two crops together is an additional cereal crop in a rotation, for to sow cereals and grass-seeds separately, either one crop of the former must be taken from, or one of the latter added to, a rotation. To lose a cereal crop in a five or six course rotation, as already said, would entail serious consequences, and interfere with the proper adjustment of production and consumption. On all well-managed farms, each department, like the segment of a circle, corresponds with another, and forms part of a perfected whole. Thus the area under white

crop must correspond with the area under grass and turnips, so that the straw produce of the former may meet the requirements of the stock the latter maintains. Independently, therefore, of the value of a crop of cereal seeds, its straw is required to carry out a uniform system, therefore a full supply of it is essential. Grass-seeds must therefore be sown with a grain crop in order to carry out a regular course of husbandry—or, in other words, to have the area under white crops proportionate to the area under grass.

But the conjunction of the two crops has also its disadvantages. The sowing of the seeds must be accommodated to the sowing of grain, irrespective of condition of soil or weather. Hence the seed-bed for grass is frequently too dry, which, if associated with an arid summer, the seeds do not germinate until the removal of the grain crop. On the other hand, if the grasses are rank and luxuriant, they greatly retard the harvesting of grain, and frequently deteriorate its value. And this early luxuriance is often injurious to the grass itself, inasmuch as it extracts from the soil valuable ingredients, and renders the roots, after the grass is cut, more exposed to the frosts of winter. And so also the influence of the grain on the grass crop; it denudes it of valuable food, and renders it more susceptible of injury from extremes of weather; but this point I shall farther on illustrate more fully.

To obviate these evils, and for the purpose of carrying out special ends, as well as to suit certain conditions of soil, the sowing of grass-seeds without a crop has recently been adopted on several farms with great success. Considering, indeed, the successful results consequent on this mode, it is surprising that it is not more generally practised where a regular system of rotation is not observed. With this, however, as it has hitherto been with the introduction of every agricultural improvement, many prejudices must be overcome, and much opposition encountered, before it meets with general favour. The mere fact that by this mode a cereal crop is lost in a rotation, is sufficient to excite prejudice against even a trial of it, as farmers readily regard it as a losing game. The old practice of summer-fallowing, now happily almost abandoned, also permitted a barren year in a rotation, but custom had not only blunted the farmers' prejudice against that system, but the many barriers to turnip-culture which existed previous to the introduction of a thorough system of drainage, rendered naked fallowing imperative. To dispense with a cereal crop in a rotation seems likewise more objectionable now than formerly, as the increased dearness of labour and higher rentals demand from land the greatest possible revenue. Unless, therefore, the advantages outweigh the disadvantages that accrue from losing a crop in a rotation, the change is nugatory, and had better not be made. There are, however, certain conditions of land which yield the most profitable results by seeding it with

grass without a cereal crop. To some of these conditions I shall now direct attention.

1*st*. *This System is essential on all exposed Uplands.*—I have already contended for a proper division of different varieties of crops in a rotation, as being as essential now as at any bygone time. If it were expedient, however, to extend the area of one crop more than another, the extension would be assigned to a grass crop, as the little outlay it involves, and the extreme prices realised for its produce—sheep and cattle—render it one of the most profitable crops in a rotation. Moreover, the recent extension of the cultivated area embraces uplands suited to the cultivation of grass, but not of cereals. This extension to the area under cultivated grasses does not come under the category of a regular course of culture, as its produce is limited to the maintaining of sheep or cattle. The extension of this crop is nevertheless one of the most important branches of rural economy, and is the medium to every pastoral improvement.

The improving farmer has not yet discovered the altitude beyond which artificial grasses cannot be profitably cultivated. The highest-lying land he has reclaimed, has amply rewarded him by yielding luxuriant grasses. With regard to cereals, the cultivable elevation is better known. It is rarely judicious in Scotland to cultivate wheat and barley above an elevation of 900 feet, and oats above 1000. Beyond these altitudes most abundant crops of all these kinds have no doubt been reaped in favourable seasons, but these are exceptional; and, as a rule, cereal crops on such altitudes, from early autumnal frosts, shaking winds, and late seasons, are rendered of little value. Beyond such elevations the union of a grass and cereal crop must cease, and the former must be cultivated alone. In harmony with all the laws of nature, this unveils a wise adaptation of means to an end—the means of raising one description of crop where it is most valuable, and where circumstances preclude the cultivation of any other.

It is worthy of remark, that the injury which grass sustains from having been sown with a white crop is greater the higher the elevation, just as the injuries from frosts are greater; so that where circumstances are most favourable to their conjunction, a grass crop sustains the least damage. The cause of this is apparent when we consider the injurious effects of a straw crop on grass. These are partly chemical, as *it* extracts valuable ingredients from the soil, and thus reduces its plant food. *They* are, however, chiefly mechanical, and caused by the roots and rootlets of the white crop diverging through and loosening all the surface-soil. Every observant farmer is cognisant of the fact of grasses succeeding best on a compact surface-soil. Trodden headlands, the impress of a cart-wheel or of a horse's foot—all attest the truth of this. Doubtless the surface-soil ought to be reduced to as fine a

state as possible before the sowing of seeds, but it cannot be too firmly compressed afterwards.* The roots of grasses in a soil thus prepared become strong and vigorous, and their tiny filaments are shielded from adverse weather by the compact soil that surrounds them. A white crop tends to undo all this surface compression. Its roots, diverging in a horizontal direction, leave, after their decay, interstices in the soil, which facilitate the evil effects of droughts and frosts. The consequences are, that the naked rootlets of clover and grasses are nipt by the frosts of winter and the biting blasts of spring. The plants become seared and sickly, and many of them die. When the situation is upland or northerly, these results are inevitable. Last season I laid a field down into permanent grass without a crop, and the young grasses were earlier in spring, and the field has throughout summer exhibited greater luxuriance, though at an altitude of 1100 feet, than the lowest-lying field in the same district sown down with a white crop. The fact is, the roots of the grasses of the former were secure and vigorous, from the compactness of the soil, when the vegetative powers of the latter were becoming enfeebled from exposure to withering blasts. The difference between the two methods, no doubt, varies in different seasons; but in the most favourable season a field of grass sown without a straw crop is easily indicated from its rich luxuriant hue, although several miles distant from the observer. Nor is the difference only in appearance, as the one maintains for several years a greater number of stock than the other. During the season succeeding that in which it is sown, grass without a crop will carry 3 sheep per acre more than when sown with it; and for several years there will be a marked difference in favour of the former. But the difference between the two modes is most apparent when we glance at the actual results obtained from growing grass without a crop. The field of grass I have already alluded to carried for three months—July, August, and September—8 sheep per acre the season in which it was sown. The profit thus afforded from the first year's pasture was more than an equivalent for the want of a white crop; for, from the late season of 1860, a white crop at an altitude of 1100 feet would not have been worth the labour that produced it. This season the same field was pastured a fortnight earlier than it would have been if sown with a crop, and has carried 6 sheep per acre. I know several fields in the counties of Roxburgh and Selkirk thus sown that have carried a greater number of sheep the first and second season than that I have named; indeed, it is scarcely possible to

* We are rather inclined to think that, in ordinary lands, a loose mould is of as much importance for grass as for cereals. Though grasses often succeed on headlands, it must be remembered that the frosts of winter render them loose and friable after having been ploughed up rough when carted upon.—ED.

overstock such pasture the first season; and frequently, for the purpose of keeping down the rapid flush of grass, it has to be depastured with cattle along with sheep. The great number of stock it maintains the first season sometimes, indeed, operates injuriously, as the grass becomes foul from the excessive quantity of excrements left upon it. Hence, in all such cases, the removal of the stock to a neighbouring field during night, or to a patch of old grass at the top of the young grass field as a lay for sheep is commendable.

It may be supposed that the proper manner of comparing the results obtained from sowing grass-seeds with and without a crop, is to give the actual value of the produce derived from each. The difference of the yield of straw crops in different seasons, difference of situation, and the varied injuries grass as well as grain crops receive from incidental causes, would render such a comparison positively worthless. Let it suffice to repeat, that on all uplands the value of grass sown the first season without a crop is equal to that of a white crop, so that the additional value, for several consecutive years of grass thus sown, renders this system the most profitable. I may mention Mr Murray, of Philiphaugh; Mr Riddell, Rink; Mr Gibson, Windydors; Mr Elliot, Blackhaugh, in Selkirkshire; Mr Gibson, Ferniehirst, Midlothian; Mr Fletcher, late of St Leonards, and Mr Young, late of Cowdenknowes, Berwickshire; and Mr Simpson, Threepwood, Roxburghshire—who have most successfully reclaimed high-lying land, and sown it down with grass-seeds without a crop. On some of these farms I have known so many as 15 sheep to the acre maintained on the first year's grass.

2d, On Mossy Soils.—The almost entire absence of mineral ingredients, and an over-abundance of vegetable matter in moss or peat, are injurious to the culture of cereals. The crops are too rapidly forced at an early stage, and their stems, being deficient in bone or strength, are soft and succulent, and therefore break down or "lodge" often before their ears are unsheathed. The grain produce is consequently of little value, and the sapless straw not worth reaping. But besides the loss of the grain crop from lodging, the young grasses, from the exclusion of air—an effect of the same cause—are destroyed. Nor can the resowing of seeds, after the grain crop is reaped, be adopted with confidence of success, as early autumnal frosts often prevent them from germinating. Equally hazardous is it to sow in spring, as the self-planted chickweed—the ever-ready occupant of vacant ground—successfully contends with the cultivated seeds for the mastery. Hence the grain crop is not only lost, but two crops of grass also; therefore the union of the two crops on moss ought to be avoided. Apart from the injurious effects of lodging, a grain crop is more injurious to grass on moss than on any description of soil. It renders more open the already too loose surface of moss land; and thus the

grass plants become a prey to droughts and frosts. Moss, to produce successfully a grain and a grass crop sown together, must be mixed with sand or clay, made as firm and compact as possible, and totally changed from its natural condition.

Light newly reclaimed land produces similar results, although in this case the luxuriant grasses which new land yields are more difficult to subdue. The practice now adopted of taking two white crops and a turnip crop previous to the sowing of grass-seeds on new land, tends to consolidate the soil, and has generally favourable results.

3d, On all Land to be laid down for permanent Pasture.—The advantage of every arable farmer having an old pasture-field is well understood. A field of rich old grass supplies suitable food for all kinds of stock—horses, sheep, or cattle—is available in all seasons, and affords valuable food when all other food-resources are dried up by scorching summer suns or the frosts of winter. A farm without *one*, indeed, is like a ship without a helm, or an engine without a safety-valve. It has provision for no emergency, cannot supply its own wants, and is liable to suffer as much from contingencies as it acquires by successes. To remedy this want, the farmer must choose between two alternatives; he must either rent an old grass-field, frequently distant from his farm, or he must dispose of his cattle in spring, and purchase again in autumn. The first mode, when resorted to, is generally more for accommodation than direct profit, but it is accommodation purchased too dearly; while the latter makes the farmer too dependent on markets, and forces him to sell or purchase at any price, irrespective of the state of the markets or of the condition of the cattle. The general want of this accommodation is probably the greatest defect in Scottish farming. The Northumberland farmer, who has invariably a field in close proximity to the steading under permanent pasture, would sooner part with the half of his farm than be without an old rich field of grass. His experience tells him that such a field is essential as a summer-grazing for the bullocks he intends to fatten, is a fine run for young horses in all seasons, is his best sheepwalk in autumn, and affords the best lay for fattening sheep in wet weather during winter.

In laying down a field for permanent pasture, the best possible means must be used to secure a *matured* pasture as quickly as possible. The sowing of grass without a crop accomplishes this end; in fact, it secures in one year a thicker sward of grass and a more matured pasture than can be obtained in four or five seasons with a crop. From the soil remaining firm and compact, as left by the compression of the roller, the roots of the grasses are kept healthy and vigorous, and secure from the effects of adverse weather. It is thus, that a thicker sward is obtained, and that grasses are earlier without than with a crop; indeed, for earliness and luxuriance the difference between the

two modes can only be appreciated by those who have witnessed the comparison. It is nevertheless quite apparent that the mode contended for, for permanent pasture, prevents the decimating of grass plants in spring which occurs on a loose surface-soil, and that a soil rendered close and compact, and undisturbed by the diverging roots of cereals, is at once, as it were, in the state of land long under grass, and is alike secure from sudden changes of extremes of weather, the attacks of snails or slugs, which are severest on a loose soil, and is at once ready for, as it receives no injury from, the treading of horses and cattle. Nor is the benefit derived from this mode, as already noticed, only apparent the first or second season; it is easily discernible for many years. I lately saw a field of pasture which was sown down fifteen years ago without a crop, and its close luxuriant sward and abundance of clover evinced the manner in which it had been seeded. Clovers especially remain long luxuriant in a soil thus sown, which is no doubt attributable to their strong affinity for a compact texture of soil.

Different opinions are entertained as to the best time for sowing seeds without a crop. Some farmers sow in April, while others delay sowing until June. The best time is probably between the two—about the beginning of May. The evil effects of an abundant crop of annual weeds consequent on the former, and of arid weather on the latter, are thus avoided. Previous to the sowing of seeds, the land cannot be too much reduced to a fine state of tilth by harrowing. After the land is seeded, it ought to be harrowed with light harrows, and afterwards pressed with a heavy roller. When the seeds are sown in May, the grass is usually ready for pasturing about the second week of July. Those who have not previously witnessed grass sown without a crop will at first be disappointed, and suppose that *its* fruits are a growth of annual weeds instead of a crop of grasses. A little time, however, will remove their fears; and although at first the rank produce may demand the use of the scythe as well as of sheep or cattle, yet after this, weeds will no more be a pest, for out of their decay will spring up verdant grasses.

The best mixture of grasses for seeding for permanent pasture depends on situation, nature, and fertility of soil. I gave the field I laid down for permanent pasture last year, and which I have more than once alluded to, 4 lb. of cow-grass or perennial red clover, 1½ lb. alsyke, 4 lb. yellow, 3 lb. white, 2 lb. of timothy, 1 lb. of perennial rye-grass, ⅛ of Italian, and 2 lb. of rape-seed. The Italian was sown to have early grass the first spring, the rape-seed was sown for the twofold object of fattening sheep and protecting the young clovers from being too *barely* eaten. The rape-seed produced the desired effect, as the sheep which were put on the field fattened with amazing rapidity. The fattening tendencies, indeed, of the grass the first season, is not the least weighty argu-

ment in favour of this mode of culture. Sheep put on it in average condition will get fat without requiring to consume any turnips. Draught ewes especially fatten very quickly on rape and young grasses, and are thus fit for the butcher without the aid of roots. Nicol Milne, Esq. of Faldonside, who has occasionally practised sowing grass without a crop for many years, and with successful results, seeds with a mixture of perennial rye-grass and clover, a little rib-grass, and a very little timothy and cocksfoot. Mr Brydon, Nether Barns, one of the most advanced farmers in Selkirkshire, or indeed of any county, seeded a field which he laid down six years ago for permanent pasture with the following varieties of seeds:—4 lb. cow-grass, 4 lb. white clover, 4 lb. alsyke, $\frac{3}{4}$ of a bushel of perennial rye-grass, $\frac{1}{8}$ of a bushel of cocksfoot, $\frac{1}{8}$ of a bushel Italian rye-grass, and from 2 to 3 lb. of rape-seed per acre. This field has all along carried a very great number of sheep, and this season was more luxuriant than on the preceding years.

On the whole, the sowing of grass without a crop ought to be invariably adopted for permanent pasture. Is the most profitable mode on mossy soils; and on some descriptions of newly-reclaimed land, is well adapted for feeding sheep in autumn, and is the only practicable mode in upland districts. It is, I apprehend, in the latter field that this system has yet to achieve its noblest triumphs, as it is fitted to utilise almost every variety of moor and mountain, and holds out to the land-improver surer and richer rewards for outlay than can be obtained in the wide range of arable or of pastoral farming.

ON DRAINING SHEEP-FARMS.

By P. R. Latham, Aberchalder, Inverness-shire.

[Premium—Medium Gold Medal.]

It cannot be denied that sheep-farming of late years has been a more profitable occupation than formerly. No matter where the flock-master is situated, the class of sheep he owns, or the system of management he pursues, his commodities, mutton and wool, have been in more steady demand, and his returns have been more remunerative.

Many contingencies, however, nay, material drawbacks, but little thought of or understood by the public, affect the interests of the sheep-farmer, and materially diminish his gains. Such, for instance, are the diseases peculiar to sheep, severity of weather, as

so strikingly exemplified in the winter of 1860, expense of wintering, increase of rent. In these circumstances, and especially with the prospect of continued, if not of improved demand for his produce, it is obviously of the last importance for the hill-farmer to use every means in his power towards maintaining his sheep stock in sound and healthy condition, by improving their walks, protecting them by shelter from the decimating effects of storms, and, if it were possible, by introducing such substitutes for turnips as would enable him to winter his hoggets at home.

These, and such like expedients, so essential to success, must be in the mind's eye of every thinking farmer, and the only question with most farmers probably is how they are to carry them into practice; particularly how are they to make arrangements with their landlords for draining their hills; for this, the subject more immediately under consideration, is, of all others, the great *desideratum*.

It is well known most Highland sheep-walks are still in a primitive state, and saturated with wet. In fact, it is no exaggeration to say, despite the facilities held out by at least one praiseworthy and patriotic society for the permanent improvement of landed property, that nine-tenths of the mountains beyond the Grampians, as well as the Grampians themselves, have not yet been drained. Many of the rich levels, corries, slopes, and mossy meadows of those regions are mere swamps and quags, hardly passable by man or beast in rainy seasons, and in dry summer sunshine it is to be feared they are but too productive of those noxious vapours and gases which are so deleterious to the health of sheep.

There can be no doubt that the succulent grass and miasmata of the marsh are the true causes of the destructive liver disease, or rot. Although it has been urged that the malady is rare on some farms where the predisposing influences seem to exist, yet there are exceptional cases in which, in all likelihood, the incipient disease is checked by some neutralising agency, such as an atmosphere impregnated with salt, or, it may be, an antidotal description of herbage. Striking instances of the cause and cure of this disease have come under my observation of late years. On an adjoining farm, its ravages were very serious previous to the marshy ground being drained, but as soon as this was accomplished the rot gradually disappeared, and the sheep became, under careful management, a sound and superior stock. Now, however, after being open for thirteen or fourteen years, these drains, which were cut much too shallow at first, are gradually filling up, and the rot has returned.

Again, on the farm in my possession, I have invariably observed more unhealthy animals on, or in the immediate neighbourhood of, swampy ground, than elsewhere. One part of the farm in particular, adjoining an island in Loch Aich, which has been partially submerged, has always been famous for them. This land has been

laid under water by raising the level of that lake, but in the droughts of spring and summer it invariably comes into view, yielding, after warm showers, quantities of soft juicy grass, which the emaciated sheep greedily devour, and thus engender the disease.

From these preliminary observations, we may deduce that sheep farming will hereafter keep pace with the general prosperity of the country—that it deserves every encouragement at the hands of proprietors—and the utmost study and skill that tacksmen can bestow. It is an old and a trite saying, whatever ameliorations are for the real benefit of the tenant, must be for the advantage of the landlord: and, if so, certainly no improvements can be effected on Highland estates at the present time, better calculated to verify the adage than the drainage and shelter of sheep-walks; for by carrying out such improvements in a judicious manner, we not only procure a more salubrious climate, but also an immense *increase* of wholesome and nutritious herbage, and more healthy and better woolled sheep. And, what is of still greater importance, the grazier, as a natural consequence, diminishes the annual mortality in his flock, and is enabled to add to its number. Moreover it is not too much to say he feels himself in a position, and is induced, from the circumstance of his knowing that he has a sound sheep-run, to adopt every available means and approved plan for improving his stock.

It was after due consideration of these facts, and a calculation of all the benefits that would accrue, that I resolved to make arrangements for the drainage of this farm, which I did by simply agreeing to pay the proprietor five per cent per annum during the currency of the lease on £300, the sum which it was computed would be required for the whole area.

This paction was settled about two years ago; and it now remains for me to relate the course I have pursued in carrying out the necessary operations, and to note the advantages that have already arisen, or may be expected to arise, from them. Before doing so, however, it may be proper to give a general view of the field of my operations.

This farm comprises a number of mountains of moderate elevation, stretching from east to west on the south of the Caledonian Canal, within 25 miles of the Western Sea. The conformation of the hills is neither rugged nor conical, but rather oblong and continuous, with broad, flat tops, and wide valleys between, containing a good deal of natural timber. The summits generally present a wide surface of broken spongy peat, good for nothing. But other parts of the less elevated ground, where circumstances favour the growth of herbage, are of a very different character, being productive of all the earlier moss-grasses, that are so beneficial to sheep after the hardships of winter. But frequently such land, and much of a deeper alluvial description, situated at a still

lower level was, while in a natural state, constantly so soaking-wet as to be of little use. Although situated at this distance from the west coast, this farm is within the range of the wet climate of the west, and is subject to all the discomfort and loss which rainy seasons and flood inflict. Stretching east and west, as the glens do, they are open to the fiercest storms that blow; and many parts afford no shelter but what can be found under the banks of a mountain burn, or deep ravine—places of refuge which too frequently prove lures to destruction. The numerous rivulets, however, with which most of the hills are furrowed, have been of great service in draining the intermediate land, and rendered the *process* comparatively easy. As the drainage of arable land varies according to circumstances peculiar to soil and locality, so it may truly be observed does the drainage of mountain pastures. No uniform method can be adopted. Practice alone enables the experienced drainer to detect the moist, as well as the saturated land; to distinguish that suffering from the oozings of springs from that merely affected by surface water; and to cut the necessary number, and the most suitable kind of drains. Much has been said about the *principle* which ought to be observed in draining; and to this no exception can be taken, provided it is a flexible one. For in draining, as in everything else, there is a right and wrong way; and it is unquestionably necessary that certain plans must be adopted and carefully carried out, in order to remove injurious water effectually.

What I maintain and reiterate is, that it is impossible to lay down any precise method for draining mountain ranges. On the contrary, the system that would answer one side of a hill might be quite unsuitable for the other. The farmer must, therefore, in my humble view of the matter, bring experience and close observation to his aid, in order to form a correct opinion of the subject to be operated on, and to act accordingly.

The great object to be attained is to drain sufficiently, and to cut up the pasture as little as possible: and in order to this, it would be well that every employer should either give personal superintendence, and exercise his own skill, or employ a contractor on whose judgment and fidelity he can rely; otherwise he will assuredly have many drains to pay for which should never have been opened.

These observations apply to the frequency, or number of drains, as well as to the *direction* of them. But on this latter important point, perhaps the most essential feature in the whole system of surface draining, more must be said.

I have made some experiments respecting the inclination or direction in which drains should be cut in the mountain side; and, after giving the matter full consideration, arrived at the conclusion that, as a general rule, they should stretch across the declivity at

such an angle as would insure a free, but not a rapid, passage to water. The great thing is to have a current that will keep the drain clear of rubbish, but not so strong as to dig and run away the bottom.

Other two points besides the slant or direction require to be borne in mind, to obviate this evil of digging: one being the length of the drain, and the other the quantity of water it may contain in wet weather. With the view of producing a *due* run of water, I have made it a rule to make drains in level and slightly inclined lands *long,* and those in hilly ground, where the declivity was considerable, *short.*

It has been argued that the practice of opening drains in this slanting manner is objectionable, because the water runs on one side of the drain, and is apt to overflow; and no doubt, where the soil is so hard and thin that they cannot be cut to the required depth, such is the tendency. But much can be done to prevent the escape of water in these situations. The workman has only to lay the sward removed from the top of the drains along their lower edge, and to clear out the channel carefully, to render them perfectly serviceable. To use a pick in increasing the depth would not make a much better drain; and this process would be expensive.

At the same time, although the mattock and pick-axe are tools seldom employed by the surface drainer, it answers and pays well to stipulate with the contractor to run over his drains from time to time, in the course of the work, and remove such snags of wood, roots, stones, or other obstructions, as materially affected, or might interfere with, the free flow of water. But even if no expedient were devised, and no extra expense incurred in obviating this evil, the damage arising would not be great; because the next drain below, and parallel to the one overflowing its margin, would in all probability catch and carry away the water escaping. This, then, is the extent of the incapacity or insufficiency of the sloping drains, and in every other respect I am convinced they excel the more modern system which of late years has been so generally adopted.

This modern method differs from the other in two very important particulars, namely, more frequent cutting, and in running the drains straight up the face of the hills in parallel lines as long as possible, usually terminating in a club-like curve. What this new-fashioned system of *regular* draining, as it is called, has to recommend it beyond carrying off so much water expeditiously, it is difficult to perceive; but it is easy to discover several objections to it.

Having examined land drained in this way, it was obvious at first sight that there was a great extent of superfluous cutting; or, in other words, an unnecessary waste of land and money. On closer inspection, I saw that the crook at the top of the drain did

not answer the purpose intended. It was too short to catch all the water coming down hill; and even if right across, could not have the desired effect. If the long ridges between the drains happened to be slightly concave in the middle, or even dead level, there was nothing to hinder the rains from flowing on, it might be, from one end to the other of them, as formerly. And if spouty ground occurred in the ridges, as often happens towards the base of a high elevation, there was no escape for the water, other than what might percolate through spongy land into an 18 inches deep drain.

While, therefore, entertaining the opinion already expressed, that there can be no fixed method for surface draining hill pastures generally, it is at the same time evident a principle must be observed in removing water from declivities and steep land, and that is, as I have endeavoured to show, by cutting the drains in a slanting or diagonal direction, and carrying them as frequently as possible into the natural rivulets and ravines of the mountains. There can be no better main-drains than these; and they should be used for this purpose wherever they are met with.

To elucidate the system I have followed still further, I may here copy the agreement (or accepted offer) for draining this farm. It is as follows:—

We hereby offer to surface-drain your farm to such extent, and in such places, as you may require, on the following conditions:—

1st, The common drains to be from 20 to 22 inches broad at the top, from 16 to 18 inches deep, and 6 inches wide at the bottom.

2d, The double drains to be two and a half feet wide at top, one and a half feet deep, and one foot wide at bottom.

3d, Main drains of greater dimensions to be opened by special agreement, as regards both size and price. But the common drains and doubles to be all made at the rate of five pounds per thousand roods, of six lineal yards to the rood; with this difference, as respects double drains, that every rood will be equal to and count as two.

4th, The whole drains to be opened in the parts, and as frequently as you shall point out, and carried, on all occasions, into the nearest natural channel.

5th, It is understood that we are to observe the above dimensions only where the land admits of being cut to the required depth with spades; and that we are not to use picks in hard or stony ground.

6th, We shall preform the work to your satisfaction, and take our instructions from yourself, or any one you may appoint, as regards the number of drains, the direction of them, or otherwise.

7th, We shall take care to disturb game as little as possible, and to prevent our men from keeping dogs, or giving you any trouble.

8th, We shall require the drains opened, to be measured and paid for at the end of every month. And it is understood you are to provide us and our men with a place of shelter on the farm, and send such articles as we cannot conveniently carry to our lodging.

9th, The employer to pay the travelling expenses from the South, of any number of labourers, not exceeding twelve, at the rate of one pound

per head, provided they continue at the work until all the drains are finished; but should they, or any of them, fail to do so; or should anything occur that would necessitate this agreement being brought prematurely to a close; in either case, the employer will not be asked to sustain such expenses.

Shortly after commencing operations, it was also found necessary to draw up and bind the contractors to observe the following instructions:—

1st, The parts of the Aberchalder Farm to be drained, must be carefully examined before commencing operations. It will not always answer to begin at the bottom of a wet piece of land. It often serves the purpose better to begin at the top, and to watch the effect produced on the lower ground. Fewer drains, in some situations, will, by observing this rule, be required.

2d, Bring all ordinary drains into ravines or mains with an easy slope, not too steep to cause digging, nor too level to cause stagnation and overflow. Have a run that will clear the bottom.

3d, Make natural water-courses serve the purpose of mains, wherever this can be conveniently done, to save cutting up land: there can be no safer, nor better conductors than these.

4th, Avoid long drains where the declivity and flow of water are considerable, and the current likely to run strong.

5th, Where boulders or sitfast stones occur in the drains, cut well round them, so that the water may have ample room—say a clear passage of at least 6 inches wide; and do not let small stones that may be readily removed by the shovel, leave a rough and uneven bottom.

6th, Where the soil is shallow, embank the low side of drains, so that there may be no overflow; and remove partially hard bottom as much as possible.

7th, A pick must be employed for removing decayed wood, roots, and such obstructions as may dam the water, and render the drains comparatively useless.

8th, No drains to be opened where they are not absolutely necessary. Such neither to be measured nor paid for; and the employer may require the contractor to fill them up again.

9th, The workman to be guided by the contractors, who will be accountable for any errors or imperfect work they may make. They must be as much under his eye as possible, and strictly superintended.

It may be expected that I should next give a statement of the size and rent of this farm; and extent, class, and expense of all the drains I have found it necessary to open. But as the amount and description of drains required on any farm must entirely depend on its character and condition, and never can be in proportion, or bear reference, to either the acreage or rent, it may suffice to say that the sum of £300 allowed for the drainage of this farm, carrying a stock of upwards of 3000 Cheviot sheep, has been found sufficient, or nearly so.

I shall therefore not dwell further on this head, but proceed to

make a few brief observations on *over-draining* and such other operations as may fairly be considered consistent with the text, and within the aim and object of the Society.

It has been said, and not without reason, that hill farms may be, and sometimes are, over-drained. To avoid falling into this error, I have studiously taken care to put the requisite number of drains, and no more, into those peaty uplands which are so productive of the early moss-grasses, and merely require to be relieved of surface water. I have also thought it advisable not to render the higher ranges, or *summering* parts of the farm, so dry as the lower wintering grounds, where the sheep live during winter, and may be driven to at any time by inclement weather.

The object of keeping the higher lands moister than the low is to provide against the effects of a scorching summer (like that of 1859), and to secure cooler and more wholesome pasture than could be looked for if the land were very frequently drained. It would be well, however, to guard against going to the extreme in this respect; for although the *tops* are not available during the frosts and snows of winter, it is plain that these elements will hold possession of them more constantly and later into the season if reposing on a *very moist* instead of a *moderately dry* surface, and thus retard, not only the growth of herbage, but also the progress of sheep up the mountains in spring.

All who have opened surface drains must have remarked the rapidity with which mountain burns become flooded after heavy rains and rendered impassable. To prevent drowning on such occasions, it is necessary to fence off precipitous and perilous situations, where sheep are in the habit of taking shelter, and to throw bridges over their usual passes. I think these precautions should be taken on most Highland farms, and that the erections should be a concurrent proceeding with the opening of drains.

This leads me to suggest another concomitant operation, namely, the construction of stells or such places of shelter (they can be readily made with the castings of drains) as would tend to prevent sheep from seeking the dangerous banks of burns and ravines for protection.

In now bringing this paper to a close, I must express a hope, as much is left for inference and the natural conclusions of the reader, that he will be able to form some, if not a correct, idea, from all that has been said, of what I conceive to be the best method of draining hill-farms. I have not touched upon the removal of water from low-lying plains or easily-drained land, nor gone into the question of dimensions, form of tools, and other details, because nothing has occurred to me on these points worthy of consideration.

As regards the *advantages* arising from surface draining, I presume no one who has given any heed to the subject will dispute that they are considerable—nay, I venture to hope that most hill-

farmers who have fairly turned the matter in their minds, are perfectly satisfied the benefits accruing must be numerous and immediate, for it does not require much penetration to perceive and comprehend them. In the first place, we have an improved climate. Despite the allegations of some, who declare no system of drainage could materially improve the climate of the west of Scotland, where double the quantity of rain falls that falls on the east side of the country, owing to the prevailing winds from the Atlantic; still I maintain that the climate of every drained grazing is improved. Although the general character of the weather is not altered by draining, yet it is certain every farmer who drains the fens and swamps of his hills must ameliorate the surrounding atmosphere, and render it more pure and salubrious.

It is this very circumstance of having a wet climate that makes the drainage of our West Highland sheep-walks all the more necessary, because this is the only means whereby we can speedily carry away the superabundant moisture, and escape the condensation of the cold and rainy mists which are exhaled from marshy ground, and returned in what may be denominated extra and ungenial showers. In the next place, it is very evident the sheep-walk is improved, for the animals have dry instead of wet ground to feed and lie upon. Those upland swamps, which held frost and snow all the winter, and were a nursery for tormenting flies in summer, are converted into sweet and wholesome meadows; and the range of the sheep in spring is wider, for the snow is not ice-bound as *formerly, and melts sooner away.*

It is equally clear the land is enriched by the droppings of animals being washed into, instead of off, the surface, and that the quality of the herbage is improved; and in this way, and as a natural consequence, sheep become healthier, produce more mutton and wool; and while the mortality on the farm is less, it becomes capable of keeping a larger stock. Last, and most important of all, we have the gain. The tenant of a good hill-farm, which has been properly drained, bridged, and sheltered in the manner indicated, is, according to my sources of information and calculations, a gainer by all the advantages arising therefrom of at least twenty per cent per annum on the money sunk in drainage.

EXPERIMENTS WITH MANURES.

By William Horn, Brome Hall Farm, Scole, Norfolk.

[Premium—The Medium Gold Medal.]

Having for a number of years applied artificials as a top-dressing to corn and grass, I have found, by these experiments, that the only substances which approach Peruvian guano on corn and grass are nitrate of soda and sulphate of ammonia; in short, the writer has not found (at the same cost) any other manure that is so efficacious. But we have also found that the seasons have a great effect as to the results obtained by the above-named manures. The season 1860 was very wet in this district (eastern counties of England), which we have always found favourable to the application of guano; therefore we believe it has stood more prominent than if the season had been of an opposite character.

We may remark that we prefer guano sown with the seed, and harrowed in; but in the following experiments it was applied on the surface same time as the other manures. The weather, being showery, brought it into immediate action.

EXPERIMENT 1st, ON WHEAT.

The field in which the wheat was grown may be termed a good mixed soil, having produced two cuttings of broad clover the previous season without any dressing; nor, on the part experimented on, was any autumn dressing applied for the wheat crop.

On the corn crops the manures were applied twice—the second week in April and the 1st of May—in order to prevent too rapid growth at one time, which is apt to make the crops lodge. The results were, as by the Table:—

WHEAT CROP, 1860.

No.	Manures Applied.	Produce.	Weight per Bush.	Value at 7s. per Bushel.	Cost of Application.	Gain by Application.
		Bush. Lb.	Lb.	£ s. d.	£ s.	£ s. d.
1.	Soil unmanured, ...	31 5	60½	10 17 6	0 0	0 0 0
2.	1 cwt. 35 lb. Guano, 1½ cwt. Salt, ...	37 0	60	12 19 0	1 0	1 1 6
3.	1 cwt. Nitrate of Soda, 1½ cwt. Salt, ...	40 11	59½	14 1 0	1 0	2 3 6
4.	1 cwt. Sulphate Ammonia, 1½ cwt. Salt, ...	38 0	60	13 6 0	1 0	1 8 6

The straw we have not included in the Table. The manure we

have charged at cost price, thus setting the produce in straw against the carting and sowing of the manures.

EXPERIMENT 2D, ON BARLEY.

The field on which the barley was grown may be termed light soil; was under wheat crop 1859; followed same season with mustard; fed off with sheep. A variation in our rotation brought the two white crops in succession, with only the mustard intervening; this, again, may be put down as produce of unmanured soil, as no farmyard manure was applied to the wheat crop previous. For results, see Table.

No.	Manures Applied.	Produce per Acre.		Weight per Bushel.	Value at 5s. per Bushel.			Cost of Application.	Gain.
		bush.	lb.	lb.	£	s.	d.	s.	s.
1.	Unmanured Soil, ...	34	0	53	8	10	0	0	0
2.	1 cwt. Guano, 1 cwt. Salt, . .	41	0	52	10	5	0	15	20
3.	¾ Nitrate Soda, 1 cwt. Salt, .	42	0	52½	10	10	0	15	25
4.	¾ Sulphate Ammonia, 1 cwt. Salt,	40	0	52	10	0	0	15	15

The straw, same as in Experiment 1st, is set against carting and sowing of manure.

EXPERIMENT 3D, ON BEAN.

The field on which the beans were grown is a good mixed soil; was oat crop 1859. The oat stubble was folded over with sheep running over the grass fields during the day, and coming into fold at night. No dung was applied to the bean crop. The beans were drilled in March; the manures applied same time as to the wheat and barley crops. The results were as below.

No.	Manures Applied.	Produce per Acre.		Weight per Bushel.	Value at 5s. per Bushel.			Cost of Application.		Loss.	
		bush.	lb.	lb.	£	s.	d.	s.	d.	s.	d.
1.	No Manure, ...	42	0	60	10	10	0	...		...	
2.	1½ cwt. Guano, ...	39	0	60	9	15	0	19	6	34	6
3.	1 cwt. Nitrate of Soda, . .	38	0	60	9	10	0	17	6	37	6
4.	1 cwt. Sulphate Ammonia, .	36	0	60	9	0	0	17	6	47	6

We may here remark that the wet season caused the beans to run too much to straw—over the field they averaged above six feet long; that where the manures where applied, much more. On

the experimental plots they resembled more a strong osier-bed than a crop of beans; hence the decrease of beans. But we may add that, in our experience, we never have derived any advantage from the application of light manures to the bean crop. For this we have found long dung most beneficial.

EXPERIMENT 4TH, ON BROAD CLOVER.

The field on which the clover was grown was under barley, crop 1859. The manures were applied the last week in April, the weather then being showery. Cut the 19th June; weighed and stacked 22d. The second cutting was not weighed; it being showery weather while making, we could not have obtained a satisfactory conclusion. In short, unless on the guano plot, there was no observable difference from the undressed plot. For results see Table: —

Nos.	MANURES APPLIED.	Weight per acre.	Value at 80s. per ton.	Cost of Application.	Gained by Application.
		cwt. lb.	£ s. d.	s. d.	s. d.
1	Unmanured soil, ...	25 0	5 0 0	...	...
2	1½ cwt. guano, ...	33 0	6 12 0	19 6	12 6
3	1 cwt. nitrate soda, . . .	34 0	6 16 0	17 6	18 6
4	1 cwt. sulphate ammonia, . .	32 56	6 10 0	17 6	12 6
5	6 cwt. gypsum, ...	27 0	5 8 0	9 0	...
6	3 cwt. Salt, ...	26 0	5 4 0	4 0	...

EXPERIMENT 5TH, ON MEADOW-GRASS, CROP 1860.

The following experiments were conducted on two meadows, which were two miles apart. A quarter of an acre was in each plot, and it was weighed in our presence, so we have every reason to believe them correct. The hay was cut the 7th July, weighed before being carted on the 12th and 13th, and the result is given in Table :—

Nos.	MANURES APPLIED PER QUARTER ACRE.	Cost of Application.	Weight per qr. acre.		Weight per acre.	Value at 70s. per ton.	Cost of Application.	Gain.
	Experiment 1st.	s. d.	cwt. lb.	Table extended to an Acre.	tons. cwt. lb.	£ s. d.	s. d.	s. d.
1	No manure, ...	..	7 56		1 10 0	5 5 0	..	..
2	84 lb. guano, ...	10 0	11 70		2 6 56	8 2 9	40 0	17 9
3	56 lb. superphosphate, 14 lb. nitrate soda, 14 lb. sulphate ammonia, . . .	7 10	11 56		2 6 0	8 1 0	31 4	24 8
4	56 lb. superphosphate, 28 lb. sulphate ammonia, ...	7 10	11 70		2 6 56	8 2 9	31 1	26 8
5	56 lb. superphosphate, 28 lb. nitrate soda,	7 10	12 60		2 10 16	8 15 5	31 4	39 1
	Experiment 2d.							
1	No manure, ...	..	7 28		1 9 0	5 1 6	..	..
2	84 lb. guano, ...	10 0	12 56		2 10 0	8 15 0	40 0	33 6
3	56 lb. superphosphate, 14 lb. nitrate soda, 14 lb. ammonia, ...	7 10	12 0		2 8 0	8 8 0	31 4	35 2
4	56 lb. superphosphate, 28 lb. sulphate ammonia, ...	7 10	11 56		2 6 0	8 1 0	31 4	28 2
5	56 lb. superphosphate, 28 lb. nitrate soda,	7 10	12 7		2 8 28	8 1 5	31 4	28 7

We may here remark that all the manures, as given above, both on corn and grass, were supplied by Mr Lawes, and we had every reason to believe them genuine: they were weighed and applied in our presence, the land and crops were measured and weighed by our own hand, and every attention was bestowed to arrive at accurate results.

EXPERIMENT 6TH, ON MANGOLDS.

The field on which the following manures were applied was wheat after beans, crop 1859. Deeply ploughed in autumn, wrought in spring to a proper tilth, the drills were formed in the usual manner: 15 yards of dung were applied all over the field; the light manures were sown by hand; the seed was drilled 3d and 4th May; the roots were stored in October; half an acre of each was weighed in our presence; the bulbs were sound and good. But it is worthy of remark that crop 1860 was some 10 to 12 tons an acre short of crop 1859, and with the same manuring—soil being equal, and treatment throughout—the difference arising from the cold season and over-abundance of rain. The following Table shows the result:—

Nos.	MANURES APPLIED PER ACRE.	Weight per acre.			Value at 12s. 6d. per ton.			Cost of Application.			Gain by Application.			Loss by Application.		
		Tons.	cwt.	lb.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1	15 yards of good dung, ...	16	4	0	10	2	6		..			..			..	
2	15 yards of good dung, 2 cwt. guano, 4 cwt. salt, ...	28	14	0	17	8	6	1	11	6	6	4	6		..	
3	15 yards of good dung, 4 cwt. Parker's blood and bones, 4 cwt. salt, . .	24	9	0	15	15	6	1	12	0	4	1	0		..	
4	15 yards of good dung, 2 guano, . .	21	15	0	13	11	10	1	6	0	2	5	4		..	
5	15 yards of good dung, 3½ packets manure, 4 cwt. salt, ...	22	10	0	14	1	3	1	13	0	2	5	9		..	
6	15 yards of good dung, 4 cwt. of salt, .	20	4	0	12	12	6	0	5	0	2	5	0		..	
7	15 yards of good dung, 4 cwt. of Lawes' manure, ...	18	0	0	11	5	0	1	6	0		..		0	3	6
8	15 yards of good dung, 4 cwt. Lawes' manure, 4 cwt. salt, ...	20	15	0	12	9	3	1	11	0	1	6	3		..	

From the above Table it will be seen that guano holds a high position, more especially in conjunction with salt. In short, in all our former experiments on this crop we have invariably found guano the most profitable application. It is our standard manure for mangolds, being fully convinced of its superiority.

EXPERIMENT 7TH, ON SWEDES.

The last experiment we are about to report in this paper was on swedes, crop 1860. The season here was unfavourable for this crop; in most cases they were a failure. So much rain fell that the land was not got in proper tilth, so essential a point in their cultivation. The seed was sown 6th June, stored and weighed 4th

and 5th November. The field where they were grown was of the same texture as where the mangolds grew, but was not got into so good tilth; however, they received every attention circumstances would admit. For result, see Table :—

Manures Applied.	Cost per Acre.	Weight per Acre.		
		Tons.	cwt.	lb.
10 yards dung, 4 cwt. Lawes' manure, ...	26s.	9	7	35
10 yards dung, Packets superphosphate, . . .	26s.	9	16	0
10 yards dung, Parker's bone and blood manure, . .	26s.	11	15	98
10 yards dung, phosphatic guano, from Messrs Lawson, .	26s.	13	7	10
10 yards dung, Peruvian guano, ...	26s.	13	1	28
10 yards dung, mixture of all the above, ...	26s.	14	1	0

It will be observed by the above Table that Peruvian guano again holds a prominent position, being only excelled by the phosphate and the mixtures; indeed, the two guanos are nearly equal. It is but justice to add, that the swedes on the phosphatic guano came away faster than any of the others.

EXPERIMENTS ON SWEDES AND POTATOES.

By John Haig, Cameron Bridge, Fifeshire.

The following Experiments on Turnips and Potatoes were made on the Farm of Methilhill. Both the Turnip and Potato fields were manured on the stubble with 10 tons of farmyard dung, which was ploughed-in during the winter. One-fourth of an acre, Scotch, was allotted for each of the different applications. The experimental drills or ridges extended the whole length of the field. The quantity of manure applied and weight of the crops all refer to the Scotch acre. The land where the Potatoes were grown is a light loam at one end of the drills, degenerating into a light sandy sort of moss at the other. Where the Turnips were grown, the soil was a good medium loam at one end, inclining to clay at the other.

Result of Experiments with the following Manures on Swedish Turnips sown on May 23, 1861.
The crops were lifted and weighed on January 4, 1862.

	Manure.				Price.			Turnips.		Per Ton.	Total.		
	tons.	cwts.	qrs.	lb.	£	s.	d.	tons.	cwts.	rate.	£	s.	d.
No. 1, Dung,	10	0	0	0	2	10	0	34	0	10s.	17	0	0
,, 2, Phospho-Peruvian guano,	0	4	0	12	2	10	3	33	0	,,	16	10	0
,, 3, Rape cake,	0	7	3	12	2	10	0	32	0	,,	16	0	0
,, 4, Mixture (dung, 5 tons, and Peruvian guano, 2 cwts.),	0	0	0	0	2	9	9	30	0	,,	15	0	0
,, 5, Peruvian guano,	0	4	0	4	2	10	0	28	10	,,	14	5	0
,, 6, Drill bones (½-inch),	0	7	1	0	2	9	10½	28	0	,,	14	0	0
,, 7, Economical manure,	0	4	0	16	2	9	8	24	0	,,	12	0	0

Result of Experiments with Walker's Early Potatoes, planted and dressed with the following Manures, on May 6, 1861.

	Manure.				Price.			Sound Potatoes.				Diseased Potatoes.				Per Ton.	Amount.			Total Sum.		
No.	tons.	cwts.	qrs.	lb.	£	s.	d.	tons.	cwts.	qrs.	lb.	tons.	cwts.	qrs.	lb.	rate.	£	s.	d.	£	s.	d.
1. Dung, ...	10	0	0	0	2	10	0	5	3	1	20		...			60s.	15	10	2	19	19	10
												3	11	2	24	25s.	4	9	8			
2. Peruvian guano, . .	0	4	0	4	2	10	0	5	4	2	8		...			60s.	15	13	8	18	18	6
												2	11	3	12	25s.	3	4	10			
3. Phospho-Peruvian guano,	0	4	0	12	2	10	3	4	14	2	8		...			60s.	14	3	8	17	7	5
												2	11	0	0	25s.	3	3	9			
4. Potato manure, . .	0	5	0	0	2	10	0	4	10	1	20		...			60s.	13	11	2	16	13	10
												2	10	0	16	25s.	3	2	8			
5. Rape cake, ...	0	7	3	12	2	10	0	4	10	2	8		...			60s.	13	11	8	16	0	9
												1	19	1	4	25s.	2	9	1			
6. Economical manure, . .	0	4	0	16	2	9	8	3	10	2	24		...			60s.	10	12	1	14	12	5
												3	4	1	4	25s.	4	0	4			
7. Nitrate of soda, . .	0	3	2	0	2	10	9	3	0	2	24		...			60s.	9	2	1	12	5	8
												2	10	3	12	25s.	3	3	7			

N.B.—The sound potatoes are set down at the low rate of 60s. per ton, as the small were amongst them when weighed.

[*Note.*—It is not our duty to endeavour to reconcile or account for apparently conflicting or contradictory experimental results. The facts must stand for themselves. One result is just as valuable as another, could we ascertain all the conditions. There is still a considerable disagreement of opinion regarding the economical use of manures rich in nitrogen and manures poor in nitrogen for turnips. We have long considered that it is scarcely possible to do justice to the two kinds of manures, when both are applied *at the same date.* When turnips obtain a plentiful supply of their earthy food, an increase of weight can only be obtained by adding nitrogen in a fit state for assimilation. The more nitrogen that is applied the longer time must the crop be allowed to work it up into its substance. Phosphatic manures promote early bulbing and early maturity; nitrogenous, late bulbing and long growth. Thus we think that, for swedes, the 23d May was rather too late a date for bringing out the full virtues of Peruvian guano, more especially on the highly manured land of Methilhill. If the crop had been ten days earlier sown, the results would probably have been very different. Mere phosphatic manures are best adapted for late sown turnips, or wherever the land is exceedingly rich. There is little fear of swedes running too much to stem from a liberal supply of nitrogenous manures, if the land is unsheltered, the seed sown early, and the management otherwise judicious. It will take as much ammonia in the manure to raise 40 tons of swedes to the acre in Scotland as it takes to raise 40 tons of mangold in England. A great deal of erroneous notions on this subject have been propagated by generalising too freely upon the relative value of phosphatic and ammoniacal manures for turnips, by founding upon results where the yield of roots was only 10, 15, or 20 tons to the acre. Mr Haig's experiments would no doubt have been enhanced in value if he had left a plot without any extra dressing. This would have tested the merits of the Economical manure. We should be glad, in the performance of our duty, to put in a note now and then to promote further investigation and research. We would do so, however, merely in the spirit of suggestion; indeed, whatever savours of authority in science is apt to become a barrier to progress. —ED.]

ON THE MANUFACTURE OF CHEDDAR CHEESE.

By Alexander M'Adam, Kilhilt, Wigtownshire.

[In October last there was a magnificent exhibition of dairy produce at Kilmarnock. The Highland Society contributed liberally for premiums. One of them was £20 for the best sweet-milk cheese, which was carried by Mr M'Adam, who has kindly furnished an outline of the method he follows in its manufacture. —Ed.]

For various reasons, I prefer making my cheese according to the Cheddar system. If the system is carried out with care and intelligence, one is almost certain of obtaining a lot more uniform and superior in quality than could possibly be made on the old Dunlop system. The latter is neither so easy nor so cleanly. In regard to quantity, I have found, after weighing the milk with the utmost care for two successive days, and making one half on the Cheddar mode, and the other half on the Dunlop, that the result is always in favour of the Cheddar.

The difference, however, in the price of the two kinds of cheese is important. In 1859 I sold my whole stock made in that season at £3, 12s. 6d. per cwt, or rather over 14s. 6d. a stone of 24 lb. In 1860, I sold all my cheese made between 23d March and 22d November, at £3, 15s., or upwards of 16s. a stone. Last year, I sent the whole to an agent in London, and, after deducting all charges, had a return of nearly 14s. 6d. a stone.

On the other hand, I have known of no Dunlop cheese sold during the last five years which has realised anything like what I have done. The difference has been at least 3s. per stone in favour of Cheddar.

I make my cheese once a day. The evening's milk, as soon as it is drawn from the cows, is put into shallow tin boynes to cool. Next morning this is put through a very fine wire sieve into the steeping tub, while the morning's milk is added as carried in from the byre. In May, and the four succeeding months, the milk put in this manner together in the evening and morning will generally have a temperature of about 80 degrees Fahrenheit. If it is not so high, a little of the evening's milk is warmed in boiling water to raise the whole to the above temperature. After this, the sour whey, annatto, and as much rennet as will coagulate the whole in an hour, are added, and well mixed.

I generally put in about 4 to 5 quarts of very sour whey to about 140 gallons of milk. As soon as the curd is properly formed, I commence to break it with a hand-breaker made of tin and wire, which is somewhat like a riddle, and having a wooden handle about 3 feet long affixed to the middle. When partially broken,

the curd is allowed to subside a little. As much whey is then drawn off and heated as will bring the whole up to a temperature of 80 degrees. After this, breaking is resumed, and the temperature maintained by adding more heated whey.

Nothing further is done for the next hour, but to draw off and heat as much whey as will raise the temperature to 100 degrees. At the end of the hour a portion of the whey is run off, and the curd is afterwards very gently broken with a shovel-breaker.

An assistant now gently pours as much heated whey as will once more raise the temperature to 100 degrees. During the time the whey is pouring, the whole is actively stirred, but afterwards more gently, till the curd has acquired proper firmness. I cannot say how long it may be necessary to stir. If too much acid is present less time is required, and if too little acid, more is necessary. The time will vary, according to these circumstances, from twenty-five to forty minutes.

When stirring is finished, the curd is left half an hour, and then the whey is all drawn off. One side of the tub is raised a little to allow this to take place more perfectly. The curd is then heaped up to the highest side of the tub, covered with a cloth, and left for half an hour. After this interval, it is cut into large slices, turned upside down, covered up, and left for another half hour. Then it is torn into thin stripes and spread on a cooler, on which it is allowed to lie for another half hour. After thus being turned upside down, it is left another half-hour longer.

The curd is then vatted and put into the press, on which 28 lb. are suspended for about twenty minutes. Afterwards it is taken out, milled, and salted. Cheshire salt is used at the rate of 2 lb. to the cwt. It is salted in the cooler, and if it is above the desired temperature, it is allowed to lie, perhaps for half an hour, and stirred up once or twice. Our dairy being very warm, I am unable to cool down the curd as low as I would wish before making it up.

On referring to my diary, I find that not one of the cheese I exhibited at Kilmarnock was below 68 lb. when vatted. The cheese is made up between two and three o'clock P.M., and a dry cloth put on it the same evening. What I make on Monday is carried to the cheese-room on Thursday. Each cheese only gets one dry cloth daily. The room is over the dwelling-house and dairy. Its temperature during summer ranges between 65 degrees to 80 degrees. The specimens of cheese I exhibited at Kilmarnock were not subjected to any artificial heat.

I use an oak steeping tub in preference to any other. All the implements and utensils are kept as sweet and clean as possible. The weight or pressure put upon the cheese is the same throughout the different stages of the manufacture.

ON THE MANAGEMENT OF HEDGES.

By ANDREW TAIT, Bankhouse, Penicuik,
Land-Steward to the Right Hon. Sir George, Clerk of Penicuik, Bart.

[Premium—The Medium Gold Medal.]

IN the present age it is not a little strange to observe the irregular, distorted, and shaggy condition of hedges, enclosing the most highly cultivated fields. In very many cases these are almost of an entirely useless description, and are consequently sources of great annoyance to the farmer, keeping his mind in a state of constant anxiety on account of their inefficiency in protecting his crops, and in affording shelter for his live stock. One great cause of this is the well known fact, that agriculturists in general, while using their utmost efforts to realise an excellent return both from their seed and stock, utterly ignore the advantages accruing to these from a due attention to the management of their fences. It will, therefore, be the object of this paper to indicate those plants which, in every respect, are best suited for forming efficient fences; to treat of the planting and after management of these; to point out the best means for restoring hedges when in an old and dilapidated state; and, finally, to give a summary of the various causes which tend to produce those evils.

In accordance with the above arrangement, the enumeration of the plants most suitable for hedging purposes requires our first attention.

The common white-thorn (*Cratægus oxyacantha*), when properly managed, makes the most effective and durable of all fences, may be trained into almost any form, and made to assume, by careful cultivation, an elegant appearance, while answering all the requisite conditions of a fence. Stretching its crooked branches in innumerable directions, closely interlacing them one with another, and arming these at all points with bristling thorns, it at once asserts its claim to be regarded as a most impenetrable barrier. It must, however, be borne in mind, that although the thorn may be cultivated on almost any soil (moss excepted), and in any European climate, clay loam is best adapted for its growth. The white-thorn stands lopping well, but it does not thrive under the drop of trees.

Next to the thorn, where *economy* is regarded, beech (*Fagus sylvatica*) occupies the most prominent place as a hedge plant. Though destitute of spines, which so particularly fit the thorn for hedging purposes, the beech, from the mass of twigs it sends forth when it is restrained in its upward or lateral growth by pruning, forms a tolerably good fence. It may be reared to great perfection on any soil, although it prefers a light one; and it has this peculiarity that, if it is not permitted to grow to the height of an

ordinary-sized tree by being frequently subjected to the pruning knife, its branches retain their withered leaves throughout the inclement season of winter, and thus afford shelter both to animal and vegetable life. The beech hedge is not so impenetrable as the thorn, because the branches of the former do not intertwine themselves so closely with one another as those of the latter, and may with little trouble be put aside, an opening in the fence being thus easily effected. The beech may be reared in all temperate climates.

The holly (*Ilex aquifolium*), were it not for its expense, the breadth of ground required for its cultivation, and its slow growth at first, would be preferable to any other hedge plant. For all the purposes of a fence it is unrivalled. It is, however, perhaps best adapted for the lawn and pleasure-grounds; for ornamenting, and affording shelter and retirement in these, it has really no equal. Although its early growth is slow, yet after it has become established in a kindly soil, about its fourth or fifth year, it is surpassed by few hedge plants in vigour of growth. In its close and impenetrable shelter, and in its beautiful and picturesque appearance, at all seasons of the year, it has been much and justly regarded. On the holly the drop of trees has not the same injurious effect as upon thorn, and it has the additional advantage of being evergreen. It will grow, and even thrive in almost any soil that is not too moist; but it attains to its greatest size in a rich sandy loam.

Besides the above, a great many other plants have been used in hedging, such as—barberry (*Berberis vulgaris*), hornbeam (*Carpinus betulus*), privet (*Ligustrum vulgare*), yew (*Taxus baccata*), sloe (*Primus spinosa*), crab (*Pyrus acerba*), osage orange (*Maclura aurantiaca*), furze (*Ulex europœus*), alder (*Alnus glutinosa*), willow (*Salix alba*), &c. These it will be superfluous to notice at any length, as they occupy only a secondary place in constructing hedges for the farm; although many of them are frequently used for ornamental purposes on pleasure-grounds. The common barberry, which abounds in the hedges of our country, grows best on a light and chalky soil. Many stems rise from one root; but as they grow upright without interlacing with each other, even although they are well armed with spines, the barberry will never take the place of the thorn or beech in the forming of a hedge for purely agricultural purposes. Hornbeam bears a striking resemblance to the beech; and from the facility with which it can be reared, the freedom with which the pruning-knife may be used, and its adaptation to poor soils congenial to the growth of the beech, it may successfully be adopted in place of the latter. Although privet grows wild in our woods and hedges, still, from its slender and flexible branches, it is utterly unfit for agricultural purposes, although it is remarkably well suited for the garden. The yew, likewise, makes an elegant garden-fence; but until the poisonous qualities

of its foliage are better understood, it cannot with safety be recommended to the agriculturist as a plant well adapted for field-hedging. The sloe and crab, plants similar in appearance to the hawthorn, may be easily reared and regularly pruned; but they are not so well suited as hawthorn for cultivation as hedge plants. The sloe is very liable to decay. It has, likewise, a great tendency to throw up suckers. The crab forms a good fence, even in a shorter time than the hawthorn; but its liability to be barked by rabbits and hares, and to be attacked by caterpillars, and the woolly blight, is a serious obstacle to its adoption as a hedge plant. Osage orange, so recently introduced from America, and so highly recommended of late as a hedge plant, does not appear to thrive in this climate. Furze forms one of the cheapest fences that can be reared; yet, notwithstanding this advantage and its facility of growth, it is deficient in one important quality, absolutely necessary to fit it for forming a good fence—viz. durability. Although in many situations it is extremely hardy, little dependence can be placed upon it where frosts prevail. On marshy ground, the most suitable plants for hedging are the alder and willow. Delighting as they do in wet and swampy lands, the ease with which they may be twisted together from the pliability of their branches and quickness of growth, peculiarly fit them for this purpose.

Of the different hedge plants above enumerated, we are inclined to prefer the thorn. As far as expense is concerned, it can be planted as cheaply as any other; and it surpasses all others in the facility with which it may be reared, and in strength and impenetrability, which careful cultivation will impart to it. It is to the thorn, therefore, that the following remarks chiefly apply.

In preparing the ground for a hedgerow it is of the first importance that, at least two or three months previously to planting, it should undergo a complete system of trenching, with an application of good farmyard manure and lime. It ought to be carefully cleared of all weeds; for if these be not removed, they will not only give the hedge a slovenly appearance, but will also greatly retard its growth, and materially impair the vital energy of the plants. In selecting these, great care must be taken to choose plants of the same variety, and, as nearly as possible, of one size and uniformity of vigour. They ought to be at least two years bedded. Plants half-an-inch in diameter are to be preferred; the vigour and extent of their fibrous roots will of course be the results of the frequency with which they have been transplanted in the nursery. In planting them in the hedge-line, they should be placed at the same depth at which they grew in the nursery—that depth being indicated by the yellow bark—and at a distance of four inches from each other. In removing them from the nursery to the fence-line, their roots must be kept moist; inattention to this will materially check the future growth of the hedge. Con-

siderable diversity of opinion exists among agriculturists as to the propriety of topping the young plants at the time of planting, or delaying this operation until their roots have taken firm hold of the ground. So far as our own experience goes, we are inclined to prefer the latter plan. It is not advisable to intermix beech and thorn in the same hedge, or any other plants with either of these, as both thrive best when growing alone. Trees in hedgerows, though giving a picturesque appearance to the face of the country, are most injurious to the hedges themselves and unprofitable to the farmer, both on account of their shade and drop, and likewise by their absorption of the nourishment of the soil. The best season for planting hedges is November or March.

Having thus briefly noticed the different plants suitable for hedges, as well as the preparation of the ground before planting, the various methods employed in that operation now naturally require consideration. The old system of forming hedge and ditch is so well known that it would be quite superfluous to give it anything more than a passing notice. The very old plan of forming a double hedge with a double ditch is too absurd to be adopted in the present day, when agricultural improvements are making such rapid progress. Of the various methods of hedge-planting, in combination with stone walls, there are only two, so far as we can judge, that may be advantageously adopted. The sunk fence, faced up with a dry stone wall, where the hedge is planted on a level with the top of it, is the best form of a live fence for a plantation; but great care must be taken in throwing up the embankment to have good soil laid near the roots of the plants. As the thorn does not thrive under the drop of trees, where the soil is suited to the beech, the latter plant is better adapted for a fence in such circumstances. The other method may be used with advantage in fencing the subdivisions of a farm, where the hedge is simply planted along the natural surface of the ground, and protected by a low stone wall, built quite close to it, on its most exposed side. Such a fence, when properly attended to, will in a few years realise the most sanguine expectations.

From the advanced state of agriculture, it becomes an object of great importance to the farmer to consider how he can avoid the needless waste of even a single foot of ground. In all the old methods of forming hedge and ditch, it must at once be obvious that a considerable portion of land is lost in the sinking of the latter. Originally, of course, the ditch, besides draining the soil for the benefit of the hedge, served also to carry off the surface water from the fields. The necessity of the ditch for these purposes has now been superseded by the system of under-drainage. Moreover, the combination of hedge and ditch has this great drawback: unless such a fence is constantly attended to with the utmost care, if there is the least slovenliness displayed in its management, the soil is apt

to fall away from the roots of the plants, leaving them exposed to every injurious influence of weather, and thus destroying their vitality. But this is not all. The embankment, from its artificial structure above the surface, becomes too dry for the health of the plants during the summer droughts, and forms a fine sanctuary for that pest of the farm, the rabbit, which is sure to take up its abode there, destroying the roots of the plant by its burrowing, and in severe winters, when it cannot luxuriate on a turnip crop, peeling the bark from off the plants themselves. Indeed, where the land is dry, the simple method of planting hedges along the natural surface of the ground is preferable to the hedge-and-ditch system in any form. In ordinary circumstances, the former method may be advantageously adopted, the roots of the plants receiving the full benefit of the soil on both sides of the fence, and being exposed to the most genial influences of the sun and rain.

The following original method of planting hedges, adopted by the writer, will be found to be attended with peculiar advantages, both to the planter and to the plants, and most certainly with none of the disadvantages alluded to above. Seeing that the healthy growth of plants in general depends on an equalisation of temperature and moisture, and knowing that thorough drainage, combined with subsoil trenching, tends to promote such an important condition, he felt persuaded that such a combination would have a most beneficial effect on the planting and rearing of hedges. He accordingly tried the experiment in a field, the soil of which is of a tilly quality, resting on a clayey subsoil, and whose altitude is 700 feet above the level of the sea, with a north-westerly exposure, and void of shelter; and, in order that the merits of the plan might be duly tested, no manure was used in the planting of the hedge. The mode of procedure was as follows: A drain was dug 4 feet deep, using 1½ inch pipe and collar, and the margins trenched 2 feet on each side to the depth of about 20 inches. The thorn bed was then taken out, and the thorns were planted four inches apart, immediately above and in a direct line with the pipes. The field had been previously thorough drained to the depth of 4 feet, and the drains were distant 9 yards from each other. The hedge drain was placed half-way between the field drains; and, in order further to test the efficacy of the plan, one-half of the line of fence was trenched five feet wide, without a drain; and there being an inequality of the surface, it was supplemented with soil from another part of the field.

In comparing the two sections of the hedge, we shall suppose No. 1 to represent the new principle, and No. 2 the other method.

The hedges were both planted on the 12th April 1858, and were cut over at the height of from 5 to 6 inches in November following; and, when measured on the 22d October 1859, the greatest length of the young shoots of No. 1 was 3 feet 10½ inches, with a thickness

of three-eighths of an inch, while that of No. 2 was 3 feet 7 inches, with a thickness of five-sixteenths of an inch. The medium length of nine measured shoots of No. 1 was 3 feet 6¾ inches, and of No. 2, 3 feet 1¼ inch. Upon examination of the roots, it was found that No. 1 sent these downwards to a depth of 24 inches, while the fibres of No. 2 inclined to run more horizontally, the greatest depth being 17 inches. Immediately above the drain the soil was quite moist, while that of No. 2 was dry. The thorns of No. 1 sent out shoots from the surface of the ground to the top where the plants were cut, and No. 2 had the whole of the shoots springing from near the top of the old stem. The undershoots of No. 1 tended to grow horizontally, while those of No. 2 took a slanting direction, leaving the old stem quite exposed. The appearance of the two hedges at this date (26th October 1860) is still decidedly in favour of No. 1. Indeed, its superiority as a line of fence to the other cannot fail to be noticed by the most casual and inexperienced observer. The strength of its individual stems, the number and length of the young shoots proceeding from these, in lateral, sloping, and vertical directions, together with the density of the lower part of the hedge No. 1, furnish the most convincing proof of the more rapid and improved form of growth which it has assumed, when placed in contrast with that part of the hedge designated No. 2. A few measurements, just taken on the spot, will serve to support the above assertions, although the apparent smallness of difference of these in detail does not serve to convey a just idea of the more striking difference which exists in the general aspect of the two sections of the hedgerow; and this may be accounted for by the greater number of unmeasured shoots, laterally and vertically, which, not being represented on paper, yet sufficiently indicate the superiority of section No. 1, without further taking into account the additional nourishment necessary to the said section, owing to the greater quantity of wood existing in it. Taking a number of the strongest stems in each part of the hedge, the average thickness of these in No. 1 was nine-sixteenths of an inch, while that of those in No. 2 was eight-sixteenths of an inch. Again, taking several top shoots in each, the average length of these in No. 1 was 3 feet, while that of those in No. 2 was 2 feet 8½ inches. The average length of the longest side shoots in No. 1 was about 2 feet, while those in No. 2 averaged about 1 foot 7 inches.

It may be necessary simply to indicate the advantages arising from the above method of hedge-planting. The cost, compared with that of a hedge planted on the edge of a ditch, will be found in favour of the new plan, when the first cost and keeping up of the ditch are taken into account, besides the saving of ground occupied by it. It may be observed that this drain will stand for one of the common drains of a field, and should not, therefore, be charged to the hedge. But we will assume that the fields on each

side of the proposed fence have been already drained, and that the drain dug for the hedge is unnecessary for the proper drainage of the field, in which case the whole expense would then fall upon the fence. The cost, per rood, of a hedge planted in this manner, reckoning pipe and collar to cost, including carriage, 30s. per thousand, and two years bedded thorns 12s. per thousand, viz.:—

	s.	d.
Cutting and filling drain, and laying pipes, ...	0	10
Fourteen pipes and collars, at 30s. per thousand, . . .	0	5
Trenching 20 inches deep, 5 feet wide, ...	0	4
Fifty thorn plants, at 12s. per thousand, ...	0	7
Planting do., ...	0	2½
	2	4½

or not including cost of drain, 1s. 1½d.; while the old method of hedge and ditch will cost the following, viz.:—

	s.	d.
Cutting ditch, ...	1	8
Fifty thorn plants, at 12s. per thousand, ...	0	7
Planting do., ...	0	2½
	2	5½

The roots, by the trenching on each side, have an increased space to seek for nourishment; and it may be reasonably expected that the plant will have an equal moisture, and this even in the driest season, by the air passing up the pipe and acting with the atmospheric air above, and thus causing a healthy moisture to pass through the soil by capillary attraction. From the equalisation of temperature thus produced in the soil, the plant will be more vigorous in spring, and better enabled to send forth strong and healthy shoots. Moreover, a saving, as has been already stated, is obtained in the drainage of the field, and less ground occupied than by the old method of hedge-and-ditch.

The various methods of planting hedges which we have noticed above do not apply to the furze hedge. For the planting and rearing of this fence the old plan seems unquestionably the best. It consists in throwing up a bank of earth 6 feet broad at the base, 5½ feet high, and 20 inches wide at the top, each side being firmly built with sods, the middle filled up with loose earth, the top rounded over, and the seed sown in a drill thereon, and covered to the depth of an inch.

In the management of young hedges various important matters must be kept steadily in view. The hedgerow must be protected on both sides from external injury, such as the cankering influence of the browsing of cattle, &c., by a paling, a dead hedge, or a combination of both. In the earlier stages of growth all weeds must be carefully removed from the plants at whatever season of the year they make their appearance, and the soil within range of the roots must be kept in a loose and friable condition, by frequent hoeing,

in order that these may have a free circulation and due supply of both air and moisture—the utmost care being at the same time taken that the fibres of the roots sustain no injury from the hoe. About the third year, or when the plants shall have become sufficiently strong to undergo the process of pruning, the pruning-knife must be applied to the hedge, in order to prepare it for its future form and stability. This must be done by an upward stroke of the hedge-bill, while vegetation is inert. In no case whatever should the hedge-shears be used. In all future prunings the intelligent and experienced hedger will not use his knife according to any fixed principle of periodical routine. He will pay particular attention to the nature and constitution of the plants; he will take into consideration all the circumstances of situation, and he will regulate his operations upon the hedge according to the vigour of the plants, training them to their required height and breadth, the proper height for a hedge being from 4½ to 5 feet, its breadth about 2½ feet, and its shape that of a wedge or sugar loaf.

The next point to be noticed is the treatment of stunted, and of old and dilapidated hedges.

In the case of stunted hedges, the ground must be carefully dug over, in such a way as not to injure the roots; thoroughly cleaned of weeds of every description; well manured and limed, as in the original preparation of the ground for planting the hedge; and if the land is wet it must be drained—the pruning-knife being used only by a person who has a thoroughly practical knowledge of hedging.

When a hedge has become bushy at top and open at the bottom, provided the plants are all, or, with few exceptions, in a thriving condition, the evil may be remedied in various ways. If an immediate fence is required, the lower lateral branches, on the most exposed side, may be cut up nearly close to the stem, and a low stone wall 2 or 2½ feet high built close to the plants, as recommended in a former part of this paper. This would blind the openings at the bottom. At the same time, the stems might be notched, which is performed by cutting a piece of wood clean out of the stem, near the bottom, by an upward and downward stroke of the cutting-bill. This fracture partially prevents the ascent of the sap, thus checking the top growth, causes innumerable shoots to spring from the stem below it, and diffuses the vital juices of the plant more equally than before, giving to the lateral branches a much more abundant supply of these than was formerly imparted. There is another method of notching which, although more tedious, is preferable: A semicircular cut is made in the bark, and about a quarter of an inch of both outer and inner bark is removed nearly half way round the stem. Shoots will spring out below this incision in the same way as above described; and the latter method has this preference, that in a few years the

wound will heal up. There is another system very frequently used in renovating a hedge of this description—it consists in topping the hedge within 3 or 3½ feet from the ground, and dressing up the sides almost close to the stems. Notches should be made in one or two places of the stems, and any vacancies should be filled up by young plants, the planting of which is afterwards treated of in the case of dilapidated hedges. Particular care should be taken that the stroke with the cutting-knife, in every instance, be made obliquely upwards, in order that the standing part of the stem be not shattered, and thereby rendered liable to injury by wetness. The plan, however, of cutting down the hedges to within a few inches of the ground seems preferable to the later method, as by that means the young shoots which spring from the old stocks will be much more equal; and any plant that seems not vigorous can be removed and its place supplied by a young one, which has a much better chance of growing than if it were overtopped by a hedge as in the other method. Instead, however, of placing young plants in the vacancies in the second year after the new shoots have sprung up from the old stocks, the shoots on each side of the gaps may be bent down and secured by a hook-headed peg, and then covered over with a little soil. In a short time these will take firm hold of the ground and send forth shoots, filling up the gaps in the hedge. This, when properly managed, is an excellent substitute for planting thorns.

In the case of old and dilapidated hedges where, by long neglect, the plants have been allowed to grow tree-like, or to decay from the effects of old age, the preferable method of renovation to be pursued is to cut the remaining plants down to the surface, to remove wholly the soil from the gaps, replacing it by virgin soil, carefully to dig, clean, manure, and lime the entire line of fence, and, should the ground be wet, to correct this by drainage. If the fence is of the hedge-and-ditch form, and the ditch be not required for conveying water from main drains, a tile should be put into the ditch, which must then be filled up. The crab, from its freeness of growth, may be used for filling up the gaps, though thorn and beech may likewise be advantageously adopted, provided strong and vigorous plants are selected. The after management must be the same with that described for young hedges. The thorns which have been cut off ought all to be kept for the purpose of protecting the line of fence by a dead hedge. In renovating old thorn hedges, there is an operation termed "plashing," which is very objectionable, from its injurious effects on the future health of the plants. The manner of performing it is by making an upward cut, more than half through the stem, next the gap, bending the stem down over the vacancy, and securing it by a hook-headed peg, or inserting it under the branch of another thorn. From the branch which has thus been laid down, shoots spring up

and fill up the gap. But the great objection to this method is, that wet penetrates the stem at the fracture, thus causing the plant to decay.

It ought to be well considered, before beginning to renew a very old and decayed hedge, whether it may not be advisable to remove it altogether, and replace it by a new one. In nine cases out of ten it will be found much more advantageous to do so, as the chances of the future growth and efficiency of a young hedge are unquestionable (*cœteris paribus*), which cannot so confidently be expected of all renovated hedges of the above description, while the cost in either case would be found to be nearly the same.

After the discussion of the above subjects this paper may, with propriety, be concluded by a summary sketch of the various causes leading to the unseemly and inefficient fences which so frequently offend the eye of the skilled agriculturist. In the first place, a very prevalent cause of the faulty fences adverted to is a total disregard to the preparation of the soil before planting. Again, this common neglect is supported in its deteriorating influence by as frequent a disregard to the proper cleaning and training of hedges when young, as well as by injudicious pruning and allowing the protecting fence to become useless by inattention to openings, however made, or by removing such fence before the hedge has attained such a strength of growth as will permit the removal of its protection, thus giving access to cattle and sheep, whose nibbling the young buds produces a very prejudicial effect upon the growth of the plants, inducing canker and other deleterious obstacles to maturity and perfection.

Other causes (and the already extended length of this paper will allow of a mere recapitulation of these) are—the stagnation of water about the roots, the destructive effects produced in severe winters by hares and rabbits peeling the bark off the stems, as well as the serious damage caused by the burrowing of the latter among the roots in the embankment, and, lastly, by planting thorns in soils unsuitable for their nourishment and growth.

Finally, it may justly be anticipated that, if proprietors and tenants were fully impressed with a due sense of the importance of these causes, and were to pay a proper, and that by no means an overtaxing, attention to the same, and probably to others which may have escaped our notice, then stunted, dilapidated, and inefficient hedges would become things of the past. But, at the same time, in order to attain this desirable end, the common maxim, that "Prevention is better than cure," must no longer be accepted as an abstract theory, but be reduced to constant and unremitting practice.

ON THE MANAGEMENT OF HEDGES.

By James Forbes, Monymusk, Aberdeenshire.

[Premium—The Medium Gold Medal.]

Many varieties of wood are now grown in the shape of hedgerows; but of these the few under-mentioned sorts being partly under my care for eighteen or twenty years, I offer some remarks as to their management.

I shall, in the first place, make mention of the holly (*Ilex Aquifolium*). The holly will grow at a greater height from the level of the sea than most of our trees and shrubs; it thrives well on suitable soil, and is admired for its beauty, durability, and as a strong fence. The holly apparently succeeds best and endures longest in deep, rich, light soil of proper drainage.

Having, as an experiment, adopted the under-mentioned modes of treatment on the same kind of soil and exposure, with the intention of ascertaining the most speedy and cheapest system of nursing a holly hedge, in the first place, I had seed gathered from the plant in autumn, which I mixed immediately thereafter with twice its bulk of sharp pit-sand. During the following summer I had them four times carefully turned over, and by the month of March of the ensuing year the pulp of the seed was rotted away, while the seeds themselves were quite fresh. One-third part of the intended line of hedgerow being then prepared to the depth of 25 inches; one cubic yard of decomposed dung, intermixed with one-half bushel of crushed bones, applied to every 25 running yards. The seed being then immediately sown to the depth of 2 inches firmly bedded in the soil; this section of the line being 200 yards long, with the intention of singling out the plants and allowing them to grow when they came up. The other half of the seed being sown in a bed broadcast at the depth of 1½ inch, also well bedded in the soil; by examining them on the 22d of November of the same year, I found that the plants in the bed of broadcast sowing had attained the height of 2 inches, those in the row only 1½ inch.

In the following summer, by the first week of May, I caused the plants in the row to be singled out to the distance of 12 inches apart, at the same time taking plants from the bed which was sown broadcast, transplanting them into another bed prepared for their reception, with the intention of nursing them to plant other 200 yards of hedge on the same kind of soil and exposure. By November of the same year the plants growing in the row were of the average height of 5 inches, while those transplanted barely made one-half inch of growth, and about one-twentieth part of the plants were dead or half dried. In the month of November of the fol-

lowing year, those sown in the row had grown to the average height of 9½ inches, while those transplanted were only 5 inches.

The following year, in the first week of May, I purchased from a nurseryman in the south of Scotland, other six hundred healthy plants, 12 inches high, with the view of planting them into another section of 200 yards long; thus having 600 yards divided into three sections of 200 yards each. The ground being prepared to the depth of 2 feet, and 1 cubic yard of dung, with bone-dust, for every 24 yards laid in bottom of the trench, the whole being then filled up, plants standing 12 inches apart in the row. Thus having, lot 1st, 200 yards of the seed sown in row; lot 2d, 200 yards of home-transplanted seedlings; and lot 3d, 200 yards of nursery plants.

At the close of three successive years, I again tested the growth of the plants in each of the three lots, and found the progress of growth as follows:—

Lot 1st, Or seed-row, being 28½ inches of average height; strong bushy plants, with only two plants dead and one half plant dried.

Lot 2d, Or home-grown plants; the average height of 20 inches, with thirteen plants dead and sixteen half dried.

Lot 3d, The nursery plants were only of the average height of 18½ inches, with twenty-four plants dead and fourteen half dried.

The above experiment convinces me that a very great advantage is derived by the sowing of holly seed in the rows, and singling them out to a proper distance; moreover, in this way, the plants much sooner attain their required height, than by any other mode that the writer has as yet practised; for although the holly be one of our hardiest shrubs, notwithstanding it is one of our most delicate shrubs to grow on transplanting. Old dilapidated holly hedges seldom succeed so well by cutting down, root pruning, or enriching the soil. Having personally assisted to stir up and enrich the soil around the roots of an old and worthless holly hedge, and then putting in a quantity of its seed berries, with their pulps rotted away, the consequence was, that they grew up sufficiently close; and in the year 1850, I had the old hedge cut away to give it freedom. It now continues to grow quite healthy.

To parties having a wish to purchase and transplant holly plants, I would beg to suggest the latter end of May as the best season for transplanting them; their roots should be firmly battered in the soil, and not pruned until the plants are advanced in growth, about 3 feet in circumference.

In cases of old holly hedges requiring to be loped down, I have always found it most successful to cut them at 9 inches from the surface; on various trials, I have found a great advantage derived by covering the above-mentioned 9 inches of stems with sawdust, moss, or meadow-grass. Plants thus protected from the rays of the sun make a much stronger and freer growth of buds.

Hawthorn.

The common thorn is an easily-procured and a well-known plant, and for farms forms one of our best fences.

Notwithstanding, we are aware that it often receives most erroneous treatment, not so much on account of careless planting, nor even of fostering the roots properly, but simply by pruning it, being a deciduous plant, at improper seasons of the year.

A great many proprietors and landowners make their gardeners and foresters proceed to prune their thorn hedges by the end of August or first of September, simply with the view of giving them a more neat and tidy appearance. By this mode of treatment the plants are deprived of nearly two-thirds of the sap that would descend to their roots at a later period of the year.

Having a young thorn hedge under my care, it being 2½ feet high, and was required to attain the height of 5¼ feet. It had been yearly pruned for a number of years in the first week of September, on both sides, as well as the top. It was apparently much stunted in growth.

I resolved to adopt another mode of treatment, as the hedge had for some years evidently made but little or any progress in growth.

No. 1. As one-third part of the hedge had dung applied to the soil around its roots every alternate year, its side and top wood pruned as usual by the first of September.

No. 2. Another third part received no manure, but simply its young wood on both sides and top allowed to ripen, and not pruned until the first week of February.

No. 3. The last part of the said line had its roots pruned by the second week of February, and 1 cubic yard of dung and lime-rubbish applied to every 20 running yards of this section. Its side-wood being pruned by the first week of September.

By this mode the young wood on the top of the hedge grew more luxuriant, and ripened well. It was afterwards pruned yearly in the first week of February.

At the lapse of four successive years the progress of growth made in each of the three divisions was as stated :—

No. 1, with its manure and unripened wood, and pruned in the first week of September, only 3 feet 8 inches.

No. 2, without any manure, but its wood ripened, and not pruned until the first week of February, 4 feet 9 inches.

No. 3, with its roots pruned and soil manured; side-wood pruned by the first of September, and crown-wood by the first of February; had attained the height of 5 feet 4 inches.

This and other experiments convinces me that if ground, prepared for thorn hedges, were digged deep and well manured before planting, and receiving the mode of treatment adopted to No. 3, that our

now extensive rows of hedging, always pruned, as they ought to be, in the wedge-shaped form, would assume a much closer and healthier appearance.

Much has been done in the way of restoring old dilapidated thorn hedges to assume vigour of growth, by loping down, root-pruning, and enriching the soil.

We think a great many parties perform these modes of treatment in an unskilful way—viz., by loping down, root-pruning, and enriching the soil all in one year. By experimental trial I have found that a hedge desired to undergo such a change should be root-pruned by the first of February, and at the same time enriching the soil around its roots while undergoing the process of filling up the trench. The roots by this process will put out many young fibrous feeding-roots during the summer; then, by the same period of the following year, the hedge ought to be cut down.

By treating thorn hedges in this way—which I have of late adopted on three separate lines of hedgerows, besides other lines undergoing the change all at once—and in all cases I find the result to be a much closer break of buds, with at least 5 inches of more growth, each of the two first years.

The line of hedging thus treated had its side-wood cut under my care by the first week of September, for three successive years; its crown-wood left to ripen, and not pruned until the first week of February; while that part of the hedgerow undergoing the process all at once had its side and crown wood pruned in the first week of February. But the result was, that at the end of three successive years I found it was 10½ inches less in growth than the former mentioned section.

Thorn hedges thrive best in the wedge-shape form. I once had a hedgerow placed under my care, which, although only 3 feet high, and 20 inches broad at 1 foot from the surface, had been allowed to swell at top to the breadth of 5½ feet; it was getting very open below, and seemed quite unhealthy.

I proceeded, in the first week of February, and dressed one side of the said hedge into the wedge-shape form, at the same time manuring the soil on each side of the line. In the following year I had the other side similarly dressed, thus bringing it to the wedge-shape form; and the result was that, at the end of three years' growth, it had attained an additional height of 22 inches, and continues to grow vigorously.

Beech.

This sort of hedge I have ever found to succeed best in low situations, amongst deep rich soil. A great many beech hedges are curtailed in their growth, in consequence of the ground not having been prepared to a proper depth, nor sufficiently manured previous to planting.

With the view of ascertaining the best mode of culture on 600 yards of this hedging, I had No. 1, 200 yards, prepared to the depth of 2½ feet, applying 1 cubic yard of dung, with one-half bushel of crushed bones to every 24 yards; dung and bones put in bottom of the trench.

No. 2, as another third part of 200 yards, had the ground prepared to the depth of 20 inches, receiving the same quantity of dung and bones as No. 1 put in the soil to the depth of 14 inches.

No. 3, the last section of 200 yards, had the ground digged over twelve inches deep, and the same quantity of dung and bones applied as that of Nos. 1 and 2.

The whole 600 yards being planted by the first week of February 1845, with their roots firmly bedded in the soil. Plants of two years' transplanted growth being made choice of, and planted at the distance of 10 inches apart in the row. This line of division had the same advantages as to soil and exposure, being all hoed and kept clean.

On examining this hedgerow in the month of December of the same year, I found that division No. 1 had four plants dead with one half dried; No. 2 had nine plants dead with one half dried; No. 3 had twenty-one plants dead with twelve half dried.

The following year, 1846, in the month of June, the whole row had a sufficient quantity of lime hoed deep into the soil around its roots. During the two following years, No. 2 had the advantage in growth over No. 1 of 3½ inches—Nos. 1 and 3 of equal growth. But, in the year 1848, No. 1 made vigorous growth of young wood, and the result was that, by the month of November 1858, No. 1 had the advantage of 8 inches over No. 2, and No. 2 had the growth of 4 inches more than No. 3.

From the above experiment I have no hesitation in asserting that the mode of culture adopted with No. 1 is the best.

In the year 1846, I assisted with the root pruning, and enriching the soil around the roots, of an old exhausted beech hedge of 300 yards long; section 1st, or 100 yards of this line, was cut over to the height of 12 inches from the surface, at the same time manuring the soil; the stems did neither break free nor grow at all vigorous during the summer, the whole 300 yards being root-pruned and manured then. Section 2d, or another third part of the hedge, was not cut down until the month of February 1847. It had its root-stems covered over with meadow-grass.

This section broke out much closer and made stronger growth of young wood during summer than those of No. 1.

Section 3d, as the last 100 yards of the said line, was allowed a second year to expand its young roots amongst the new enriched soil. It was cut down by the month of February 1848, and its stems covered with peat-moss. By this time the young fibrous

feeders were well established in the soil, and there was a still freer break of buds than those of No. 2, and it also made astonishing growth of young wood during the summer; and at the present time it has the advantage of 14 inches over No. 2, and No. 2 had also the advantage of 9 inches over No. 1.

On this account, experiment teaches me to approve of root-pruning and manuring the soil of old beech hedgerows, two years previous to their being cut down.

Hornbeam (*Carpinus Betulus*).

A hedge of these will succeed in almost any soil and exposure, and we think it ought to be more generally cultivated, seeing that it forms a strong and efficient fence around nurseries and also young plantations, affording much shelter. I have from frequent trials ascertained that pruning Hornbeam only once in the two years greatly enhances the growth of the plant until it attains its desired weight. The buds break freer from wood of second year's growth, which continues to grow much stronger during the summer. By this mode of treatment I always find an additional growth on the plant of at least 4 inches annually. We seldom meet with it turning open below, if properly managed and pruned, in the wedge-shape form.

Moreover, until it has attained the desired height, by pruning off one-half of its side-wood every alternate year by the first week of September, greatly facilitates the growth, and also the ripening of the crown-wood.

Privet (*Ligustrum Vulgare*).

This is a plant in hedgerows very well adapted for subdividing flower-gardens, or pleasure grounds; it succeeds best when grown amongst rich light soil in lowland districts. It ought never to be allowed to grow high or slender, seeing that it is very liable to be bent down and broken by the heavy falls of snow in winter; I have found the most proper time for pruning it to be in the end of March, when the severity of winter is over.

Another variety of Privet (*Ligustrum Sempervirens*) has been found to succeed better than the above-mentioned when grown in exposed situations, vicinity of cities, and also under shade; but both varieties I find to succeed best when protected from the severity of the weather.

Whin or Furze (*Ulex Europœus*).

Hedges of this plant are not much esteemed in lowland districts, but in the north of Scotland, where thorn, beech, or holly does not succeed. It is sometimes grown as a live fence, on the top of old stone walls or sunk fences. It thrives best in light sandy soils, and when the soil is slightly stirred around its roots after shed-

ding its seed in autumn. By this process the seed vegetates freely in spring, and in many cases grows up, and keeps the hedgerow close and healthy for a great many years.

Sea Buckthorn (*Hippophæ Rhamnoides*).

This plant, being extremely hardy, is well suited for hedgerows in bleak moorland districts, more especially by the sea-side, and sustains no injury from sea-breezes; it will grow freely in any light medium soil in almost any exposure. This plant is well adapted for being planted as one-half of a double hedge, along with Privet. The Privet should be grown on the side most in view, and will be borne up by intermixing to a considerable height with the Buckthorn.

Elder (*Sambucus Nigra*).

This plant in a hedgerow is admired by some and despised by others; however, we meet with it often growing as a fence, and for shelter for nurseries and gardens. It thrives and also grows more handsome in light poor soil; and when properly managed, it does very soon attain the desired height of affording shelter. It is by no means unseemly as a fence during summer, when it undergoes regular pruning, and kept tidy.

PREMIUMS AWARDED BY THE SOCIETY IN 1861.

NOTE.—The awards at the Perth Show, having already been published, are excluded.

REPORTS.

1. L.25 to James Sanderson, land valuer and agricultural adviser, 13 Cannon Row, Westminster, for a Report on the Agriculture of Berwickshire and Roxburghshire.
2. The gold medal to James Cowie of Culvennan, Haulkerton Mains, Kincardineshire, for a Report of improvements on the Estate of Culvennan, Wigtownshire.
3. The gold medal to James M'Gillivray, V.S., Rayne, Aberdeenshire, for a Report on Joint-ill in Cattle and Sheep.
4. The gold medal to James Mitchell, Bruckleseat, Fyvie, Aberdeenshire, for a Report on the reclamation of waste land by tillage.
5. The gold medal to said James Sanderson, for a Report on laying down grass without a white crop.
6. The medium gold medal to William Horn, Brome Hall, Scole, Norfolk, for a Report on the comparative value of guano and other special manures as top-dressings.
7. The medium gold medal to Robert Hutchison of Carlowrie, Kirkliston, for a Report on the effects of frost—1860-61—on trees and shrubs.
8. The medium gold medal to W. S. Macdonald, Factor, Springkell, Ecclefechan, for a Report on top-dressing for pasture.
9. The medium gold medal to Christopher Young Mechie, Forester, Duthil, Carrbridge, for a Report on the cultivation of willows.
10. The medium gold medal to said James Sanderson, for a Report on improving hill pastures.
11. The medium gold medal to Samuel D. Shirriff, Saltcoats, Drem, for a Report of experiments with special manures for green crops.
12. The silver medal to Hugh Borthwick, Traquair Knowe, Peebles, for a Report on paralysis in lambs.
13. The silver medal to James Byrne, Wallstown Castle, Shanballymore, county Cork, for a Report on laying down grass without a corn crop.
14. The silver medal to John Stevenson, Garrallan, Old Cumnock, for a Report on top-dressing for pasture.

DISTRICT COMPETITIONS.

CATTLE.

The District of Lorn.

BULLS, Class I.*	1. Dun. M'Callum, Kilmaronaig, Oban	L.8	0	0
	2. Dun. Clerk, Duntannachan, Oban,	4	0	0
BULLS, Class II.†	John Stevenson, Balimore, Oban,	5	0	0
HEIFERS.	1. Dun. M'Callum, Kilmaronaig, Oban,	5	0	0
	2. Dun. Clerk, Duntannachan, Oban,	3	0	0

The District of Mar.

BULLS	William M'Combie of Easter Skene,	Silver Medal.		
HEIFERS.	1. James MacKnight, Boghead, Monymusk,	L.2	10	0‡
	2. Dr Rainy, Kintore,	1	10	0‡

* Class I., Bulls calved before 1st January 1859.
† Class II., Bulls calved after 1st January 1859.
‡ Half Premiums awarded, the number of lots being under six.

The District of the Jedburgh Society.

BULLS, Class II.	Andrew Haddon, Honeyburn, Hawick,	L.2 10 0*
HEIFERS.	1. Peter Brodie, Clarilaw, Lilliesleaf, .	5 0 0
	2. John Dodd, Catscleuch, Rowchester, Northd.,	3 0 0

The County of Ayr.

BULLS.	John Hyslop, of Bank, New Cumnock,	Silver Medal.
BULLS, Class I.	1. John Parker, Nether Broomlands, Irvine,	L.8 0 0
	2. R. Turnbull, Burnston, Cumnock, .	4 0 0
BULLS, Class II.	John Parker, Nether Broomlands, Irvine,	5 0 0
HEIFERS.	1. James Reid, Mid-Sanquhar, St Evox, .	5 0 0
	2. James Morton, Townhead of Drumley, Tarbolton, ...	3 0 0

The County of Renfrew.

BULLS.	John Pollock, of West Walton, Mearns,	Silver Medal.
BULLS, Class I.	1. George Paton, Bankhead, Renfrew, .	L.4 0 0*
	2. Alex. Holm, Jaapstone, Neilston, .	2 0 0*
BULLS, Class II.	George Paton, Bankhead, Renfrew, .	2 10 0*
HEIFERS.	1. John Robertson, Hillington, Abbey, .	2 10 0*
	2. Peter M'Dermid, Paisley, . .	1 10 0*

The County of Stirling.

BULLS.	The Duke of Montrose, Buchanan House,	Silver Medal.
BULLS, Class I.	1. A. & A. Mitchell, Alloa, . .	L 4 0 0*
	2. Neil MacEwen, Blackdub, Stirling, .	2 0 0*
BULLS, Class II.	A. & A. Mitchell, Alloa, . .	5 0 0
HEIFERS.	1. James Forrester, Kepdarroch, Stirling,	5 0 0
	2. George Pender, Dumbreck, Kilsyth, .	3 0 0

The County of Inverness.

BULLS, Class I.	1. Alexander Fraser, Faillie, Inverness, .	L.8 0 0
	2. Alexander Fraser, Garbol, Beauly, .	4 0 0
BULLS, Class II.	Robert Anderson, Kildrummie, Nairn,	5 0 0
HEIFERS.	1. George Macdonald, Dultulich, Strathnairn,	5 0 0
	2. Alexander Fraser, Faillie, Inverness, .	3 0 0

The District of the Strathbogie Club.

BULLS.	Her Grace The Duchess of Gordon, .	Silver Medal.
BULLS, Class I.	1. Walter Scott, Glendronach, Huntly, .	L.8 0 0
	2. Captain Gordon, Ittingston, Huntly, .	4 0 0
BULLS, Class II.	Charles Walker, Drumblair, Huntly, .	5 0 0
HEIFERS.	1. Walter Scott, Glendronach, Huntly, .	5 0 0
	2. Charles Bruce, Broadland, Huntly, .	3 0 0

The County of Elgin.

BULLS.	Robert Scott, Manbeen, Elgin, . .	Silver Medal.

The District of Spey, Avon, and Fiddoch Society.

BULLS.	Sir George Macpherson Grant of Ballindalloch, Bart., ...	Silver Medal.

DRAUGHT-HORSES.

The County of Caithness.

STALLIONS.	Robert Wilson, Durn, Portsoy, . . .	L.25 0 0
MARES.	Alexander Henderson of Stemster, . .	10 0 0
FILLIES.	Sir John Sinclair of Dunbeath, Bart., Wick,	5 0 0

* Half premiums awarded, the number of lots being under six.

The County of Kincardine.

STALLIONS.	James Drummond, Blacklaw, Dunfermline,	L.25 0 0
MARES.	William Scott, North Leys, Banchory, .	10 0 0
FILLIES.	John Keith, Logie, Stonehaven, . .	5 0 0

The District of the Perth, Fife, Kinross, and Clackmannan Association.

STALLIONS.	William Wilson, Leven, . . .	L.30 0 0

The Stewartry of Kirkcudbright.

STALLIONS.	Peter Crawford, Dumgoyack, Strathblane, .	L.25 0 0
MARES.	William Grierson, Torr, Castle Douglas, .	10 0 0
FILLIES.	George Henderson, Airdrie, Kirkbean, .	5 0 0

The District of Machars, in Wigtownshire.

STALLIONS.	Daniel Crawford, Barnbeath, Kilbarchan,	L.25 0 0
MARES.	James M'Connell, Low Glasnick, Newton-Stewart, ...	10 0 0
FILLIES.	Alexander M'Culloch, Kirkland, Kirkinner,	5 0 0

ENTIRE COLTS.

The County of Stirling.

TWO-YEAR-OLD COLTS.	Andrew Bowie, Gilmeadowland, Linlithgow, ...	L.6 0 0
ONE-YEAR-OLD COLTS.	John Cowbrough, Milling, Port of Monteith, ...	4 0 0

The County of Forfar.

ONE-YEAR-OLD COLTS.	David Smith, West Mains, Dunnichen, Forfar, ...	L.4 0 0

The Island of Bute.

TWO-YEAR-OLD COLTS.	James Hunter, Shallunt, Rothesay,	L.3 0 0*
ONE-YEAR-OLD COLTS.	John M'Dougall, Kerrytonlia, Rothesay,	2 0 0*

LEICESTER SHEEP.

The District of Lauderdale.

TUPS.	Thomas Simson, Blainslie, Lauder, .	Silver Medal.
TUPS.	Thomas Simson, Blainslie, Lauder, .	L.2 10 0*
SHEARLING TUPS.	William Purves, Burnfoot, Kelso, .	2 10 0*
EWES.	Thomas Simson, Blainslie, Lauder, .	2 10 0*

CHEVIOT SHEEP.

The Districts of Mull and Morven.

TUPS.	John Campbell of Possill, Oban, . .	Silver Medal.
TUPS.	Walter Elliott, Scoor, Bunessan, Oban, .	L.5 0 0
SHEARLING TUPS.	Ebenezer Thorburn, Isle of Muck, Tobermory,	5 0 0
EWES.	Ebenezer Thorburn, Isle of Muck, Tobermory,	5 0 0
SHEARLING EWES.	W. E. Oliver, Glenforsa, Oban, . .	4 0 0

The Districts of Gairloch and Lochbroom.

TUPS.	David Mundell, Auchindrean, . .	L.5 0 0
SHEARLING TUPS.	David Mundell, Auchindrean, . .	2 10 0*
EWES.	David Mundell, Auchindrean, . .	2 10 0

* Half premiums awarded, the number of lots being under six.

The District of Nithsdale.

TUPS.	G. M'Call, Burrance, Kirkmichael, Dumfries,	L.5 0 0
SHEARLING TUPS.	D. Paterson, Wood, Kirkmichael, Dumfries,	5 0 0
EWES.	D. Paterson, Wood, Kirkmichael, Dumfries,	5 0 0
SHEARLING EWES.	D. Paterson, Wood, Kirkmichael, Dumfries,	4 0 0

The District of Annandale.

TUPS.	John Carruthers, Kirkhill, Moffat,	Silver Medal.
TUPS.	Thomas Brydon, Kinnelhead, Moffat,	L.2 10 0*
SHEARLING TUPS.	Thomas Brydon, Kinnelhead, Moffat,	2 10 0*
SHEARLING EWES.	Thomas Welsh, Erickstane, Moffat,	2 0 0*

The Districts of Eskdale and Liddesdale.

TUPS.	James Brydon, Moodlaw, Langholm,	Silver Medal.
TUPS.	Thomas C. Borthwick, Hopsrig, Langholm,	L.5 0 0
SHEARLING TUPS.	James Brydon, Moodlaw, Langholm,	5 0 0
EWES.	James Brydon, Moodlaw, Langholm,	5 0 0
SHEARLING EWES.	James Brydon, Moodlaw, Langholm,	4 0 0

The County of Peebles.

SHEARLING TUP.	Sir Graham G. Montgomery, Bart., M.P.,	Silver Medal.

BLACKFACED SHEEP.

The Island of Arran.

TUPS.	James Allan, Clauchan, Arran,	L.5 0 0
SHEARLING TUPS.	James Allan, Clauchan, Arran,	5 0 0
EWES.	James Allan, Clauchan, Arran,	5 0 0
SHEARLING EWES.	James Allan, Clauchan, Arran,	4 0 0

The Upper Ward of Lanarkshire.

EWES.	Heirs of James Watson, Nisbet, Biggar,	L.2 10 0*
GIMMERS.	James Bell, Fallburns, Biggar,	2 0 0*

The District of Argyll.

TUPS.	Alex. Campbell of Auchindarroch, Lochgilphead,	Silver Medal.
TUPS.	Robert Lawrie, Fincharn, Lochgilphead,	L.2 10 0*
SHEARLING TUPS.	James M'Kechine, Torren, Lochgilphead,	2 10 0*
EWES.	Neil M'Kellar, Kilmartin, Lochgilphead,	2 10 0*
SHEARLING EWES.	Robert Lawrie, Fincharn, Lochgilphead,	2 0 0*

SHEEP-SHEARING.

The Island of Arran.

Robert Crawford, Jun., Glenscorrodale, . . . Silver Medal.

SWINE.

The County of Edinburgh.

BOARS.	1. John Wilson, Cross House, Roslin,	L.2 0 0*
	2. Trustees of late John Finnie, Swanston,	1 0 0*
SOWS.	1. John Wilson, Cross House, Roslin,	1 10 0*
	2. Harry Maxwell Inglis, Glencorse House,	0 10 0*

The District of the Moffat Society.

SOWS.	1. William Arthur, Capplegill, Moffat,	L.1 10 0*
	2. Jonathan Johnstone, Chapel, Moffat,	0 10 0*

* **Half premiums awarded, the number of lots being under six.**

The District of the Jedburgh Society.

BOARS.	John Ord of Muirhouselaw, Nisbet, Kelso,	Silver Medal.
BOARS.	1. John T. Clark, Ilderston, Alnwick, . .	L.4 0 0
	2. James Hogarth, Merton Mill, St Boswells,	2 0 0
SOWS.	1. Robert Bell, Cessford, Jedburgh, . .	3 0 0
	2. Robert Bell, Cessford, Jedburgh, . .	1 0 0

DAIRY PRODUCE.

The Counties of Wigtown and Ayr and District of Nithsdale.

SWEET-MILK CHEESE.	1. Alexander M'Adam, Kilhilt, Stranraer, .	L.20 0 0
CURED BUTTER.	1. John White, Dykes Croft, Kilmarnock, .	6 0 0
	2. Gavin Muir, Fingart, Dunlop, . . .	4 0 0
FRESH BUTTER.	Fred. J. Turner, Kilmarnock, . .	Silver Medal.

The District of the Glasgow Society.

CURED BUTTER.	1. Archd. Lambie, Kirkland, Eaglesham, .	L.3 0 0
	2. Mrs A. Smith, Blairmuckhole, Shots, .	2 0 0
SWEET-MILK CHEESE.	1. John Cochran, Cleughern, East Kilbride .	3 0 0
	2. James Allan, Westmains, Stonehouse, .	2 0 0

The District of Kintyre.

CURED BUTTER.	1. Samuel Clark, Skeroblin, Campbeltown, .	L.3 0 0
	2. James M'Nair, Smerly, Campbeltown, .	2 0 0
SWEET-MILK CHEESE.	1. George F. M'Neal, High Lossit, Campbeltown,	3 0 0
	2. John Mitchell, Ballymenach, Campbeltown,	2 0 0

GENERAL EXHIBITION OF SEEDS AT EDINBURGH.

The Silver Medal was awarded to each of the following parties:—

SPRING SHOW.

1. Peter Inglis, East Pilton, Edinburgh, for Talavera Wheat.
2. John Gibson, Woolmet, Dalkeith, for Red April Wheat.
3. William Christie, Markle, Prestonkirk, for Oxford Prize Wheat.
4. James Wilson, Sheriffside, Gifford, for Potato Oats.
5. James Stenhouse, Myles, Tranent, for Hopetoun Oats.
6. John Gibson, Woolmet, Dalkeith, for Early Angus Oats.
7. Robert Nisbet of Lambden, Greenlaw, Berwickshire, for Sandy Oats.
8. James Steedman, Boghall, Roslin, for Berley Oats.
9. Adam Curror, Myreside, Edinburgh, for Black Tartar Oats.
10. James Steedman, Boghall, Roslin, for Providence Oats.
11. James Steedman, Boghall, Roslin, for Common Barley.
12. Sir Thomas Buchan Hepburn of Smeaton, Bart., Prestonkirk, for Chevalier Barley.
13. Robert Cross, Hilltown, Liberton, for Early Field Beans.
14. A. J. Balfour of Whittingham, Prestonkirk, for Late Field Beans.
15. John H. Hope, South Elphinstone, Tranent, for Scotch Tares.

AUTUMN SHOW.

16. Thomas Elder, Amisfield Mains, Haddington, for Hopetoun Wheat.
17. Robert Cross, Hilltown, Liberton, for Woolly Eared Wheat.
18. Robert Hislop, Jr., Prestonpans, for Red Chaff White Wheat.
19. James Stenhouse, Myles, Tranent, for Red Straw White Wheat.
20. Robert Binnie, Seton Mains, Longniddry, for Trump Wheat.
21. Robert Cross, Hilltown, Liberton, for Archer's Prolific Wheat.
22. John Deans, Hedderwick Hill, Dunbar, for Sherriff's Bearded White Wheat.

23. John Dickson, Saughton Mains, Slateford, for Hunter's Improved White Wheat.
24. Alexander Macdougal, Granton Mains, Edinburgh, for Druid Wheat.
25. William Pringle, Harperdean, Haddington, for Pringle's Bearded White Wheat.
26. James Park, Cliftonhall Mains, Ratho, for Smooth Chaff White Wheat.
27. James Hope, Duddingston, Portobello, for Sherriff's Bearded Red Wheat.
28. John Proudfoot, Pinkiehill, Musselburgh, for Dunstable Red Wheat.

The Bronze Medal was awarded to each of the following parties:—

SPRING SHOW.

1. John Curror, Colinton Mains, Edinburgh, for Talavera Wheat.
2. James W. Hunter of Thurston, Dunbar, for Potato Oats.
3. Robert Cross, Hilltown, Liberton, for Hopetoun Oats.
4. James Stenhouse, Southfield, Corstorphine, for Early Angus Oats.
5. A. J. Balfour of Whittingham, Prestonkirk, for Sandy Oats.
6. Adam Stodart, Damhead, Loanhead, for Berley Oats.
7. Robert Hutchison, Fosterton, Kirkcaldy, for Black Tartar Oats.
8. Thomas Brown, Pentland Mains, Loanhead, for Providence Oats.
9. John Gibson, Woolmet, Dalkeith, for Canadian Oats.
10. David Broadwood, Crowhill, Dunbar, for Chevalier Barley.
11. George Stenhouse, West Pilton, Cramond, for Early Field Beans.
12. James L. Millar, Waulkmill, Dunfermline, for Late Field Beans.
13. James Christie, Hailes, Prestonkirk, for Scotch Tares.

AUTUMN SHOW.

14. Bentlem Douglas, Cairntows, Liberton, for Woolly Eared Wheat.
15. George Stenhouse, West Pilton, Blackhall, for Archer's Prolific Wheat.
16. Thomas Mylne, Niddry Mains, Liberton, for Sherriff's Bearded Red Wheat.
17. Robert Binnie, Seton Mains, Longniddry, for Giant Red Wheat.

DISTRICT EXHIBITIONS OF SEEDS.

The County of Inverness.

Hugh A. Gair, Hilton, Inverness, for Chevalier Barley.
James Stewart, Balmacaan, do., for Sandy Oats.
Donald Paterson, Balrobert, do., for Perennial Rye-Grass.

The County of Nairn.

James Sharp, Newton of Budgate, Nairn, for Grey Angus Oats.
John Robb, Arr, Nairn, for Chevalier Barley.
Alex. M'Arthur, Boghole, Forres, for White Wheat.

The County of Fife.

A. W. Russell, Parkhill, Newburgh, for Wheat (*Jackson's Nonsuch*).

The County of Ayr.

Captain Campbell of Craigie, Ayr, for Chedham Wheat.
Thomas Bone, East Sanquhar, St Evox, Ayr, for Chevalier Barley.
C. D. Gairdner, Auchans, Dundonald, for Tam Findlay Oats.
William Young, Woodside, Kilwinning, for Perennial Rye-Grass.

The County of Stirling.

Neil M'Ewen, Blackdub, Stirling, for Hunter's Wheat.

The District of Glen Urquhart.

The Earl of Seafield, Balmacaan, for Sandy Oats.
John Sinclair, Borlum, for Chevalier Barley.

The District of the Black Isle.

Donald M'Kay, Kessock, Inverness, for Chevalier Barley.
Alex. Thomson, Tarradale, Beauly, for Potato Oats.

GREEN CROPS ON SMALL POSSESSIONS.

The Parishes of Kenmore and Killin.

Andrew Walker, Camussurich,	L.3	0	0
Archibald Walker, Blarmore,	2	10	0
John M'Laren, Achomer,	1	10	0
Peter Stewart, Craganester,	1	0	0

PLOUGHING COMPETITIONS.

In the course of the year 1860-61, the Society's Medal was awarded at 135 Ploughing Competitions, the details of which were published in the Transactions for July last.

MEDALS IN AID OF PREMIUMS GIVEN BY LOCAL SOCIETIES.

The Silver Medal has been awarded to the following parties:—

The District of the Forbes and Fordyce Association.

Samuel Stewart, Sandhole, Strichen, for Shorthorn Bull.
John Pittendrigh, Bodychell, Fraserburgh, for Shorthorn Cow.

The Western District of Midlothian.

Andrew Morton, Biccarton, Whitburn, for Ayrshire Bull.
John Kerr, Morton, Kirknewton, for Two-year-old Filly.

The District of Breadalbane and Weem.

Alexander M'Lean, Borlick, for best Green Crop.
John M'Pherson, Portbane, for best-kept Dunghill.

The District of the Buchan Society.

William Arbuthnot of Dens, for Shorthorn Bull.

The District of the Avondale Society.

Andrew Logan, Cleddans, East Kilbride, for Ayrshire Cow.
Robert M'Kean, Lumloch, Bishopbriggs, for Ayrshire Bull.

The District of the Wester Ross Club.

Sir Kenneth S. M'Kenzie of Gairloch, Bart., for Cross-bred Cow.

The District of the Mauchlin Society

Mrs Bryce Nairn, High Welton, for best-managed Dairy.

COTTAGES AND GARDENS.

FOR THE BEST-KEPT COTTAGES AND GARDENS.

First Cottage Premium, L.1, 5s., and Medal when Four Competitors; Second, L.1; Third, 15s. First Garden Premium, L.1, 5s., and Medal when Four Competitors; Second, L.1; Third, 15s.

PARISH OF FORGUE.—1st Cottage Premium and Medal, Alexander M'Robert; 2d, James Riddock; 3d, Adam Robertson. 1st Garden Premium and Medal, Peter George; 2d, Gordon Campbell; 3d, James Harper.

PARISH OF LEOCHEL CUSHNIE.—1st Cottage Premium and Medal, Charles Murray; 2d, Charles Birse; 3d, George Henry. 1st Garden Premium and Medal, George Henry; 2d, Joseph Durward; 3d, Francis Lawson.

PARISH OF STRICHEN.—1st Cottage Premium and Medal to George Nicol; 2d, Harry Emslie. 1st Garden Premium and Medal to William M'Donald; 2d, Andrew Baxter; 3d, William Linn.

PARISH OF FALKLAND.—1st Garden Premium and Medal to Walter Williamson; 2d, James Anderson; 3d, Alexander Walker.

PARISHES OF NEWBURGH AND ABDIE.—1st Garden Premium and Medal, Mrs Walter Mackie; 2d, David Laurie; 3d, George Bett.

PARISH OF URR.—1st Cottage Premium and Medal, Mrs William M'Bryde; 2d, John Richardson; 3d, James Hartley. 1st Garden Premium and Medal, James Cameron; 2d, James Craik; 3d, John Richardson.

PARISH OF LESMAHAGOW.—1st Garden Premium and Medal, Robert Corbet; 2d, Joseph M'Askie; 3d, James Faulds.

PARISH OF COVINGTON.—1st Cottage Premium and Medal, John Balloch; 2d, Thomas Porteous; 3d, James Wilson. 1st Garden Premium and Medal, James Wood; 2d, Thomas Porteous; 3d, Thomas Martin.

PARISH OF ANCRUM.—1st Cottage Premium, Peter Smith. 1st Garden Premium, Stewart Bon.

PARISH OF ST MARTINS.—1st Cottage Premium and Medal, John Watson; 2d, William Butters; 3d, William Kinnear. 1st Garden Premium and Medal, William Butters; 2d, George Chesser; 3d, Hugh Niven.

PARISH OF LESWALT.—1st Cottage Premium and Medal, William Hamilton; 2d, William Angus; 3d, Hugh Murdoch.

MEDALS GIVEN IN AID OF PRIVATE COMPETITIONS.

PARISH OF ABERNETHY.—George Spence, for best-kept Garden.

PARISH OF MAUCHLINE.—Thomas Wilson, jun., for best-kept Garden.

VETERINARY COLLEGE.

Silver Medals were awarded, at the annual Examination in April last, to the following parties:—

1. Andrew Smith, Torr, Dalrymple, Ayr, for best general examination.
2. Said Andrew Smith, for best examination in Chemistry. } Equal.
3. John Cassie, Blackbraes, Aberdeen, for best examination in Chemistry. } Equal.
4. Said Andrew Smith, for best examination in Anatomy. } Equal.
5. Samuel J. Wills, Axminster, for best examination in Anatomy. } Equal.
6. Peter Moir, Edinburgh, for best examination in Horse Pathology.
7. Said Samuel J. Wills, for best examination in Cattle Pathology.

All Premiums not applied for within two years from 1st January last will be forfeited.

By order of the Directors,

JN. HALL MAXWELL, *Secretary.*

EDINBURGH, *12th February* 1862.

RELATIVE PRODUCTIVENESS OF DIFFERENT KINDS OF OATS.

By Wm. Walker, Ardhuncart, Aberdeenshire.

[Premium—Medium Gold Medal.]

The following experiments on four different kinds of oats were made for the purpose of determining the relative productiveness in grain and straw of the following varieties—Kildrummy Oats, Scotch Birley, English Birley, and Potato.

The field on which the experiment was conducted has a southern exposure, well sheltered from the north by a hill and plantation; the soil is perfectly dry, and, although what is termed outfield land, is of medium quality, resting on a subsoil of gravelly clay. It was well laid out for three years under grass, which was pastured with cattle. It lies thirty-three miles from the sea, and about 500 feet above its level. The field contains apwards of twenty imperial acres, four acres of which were chosen of the most equal quality of soil. The oats were all sown on the 16th of April, with a drill machine, five inches apart between the rows. The machine was particularly cleaned before and after sowing each variety.

The three first-mentioned kinds I have grown for a considerable number of years, and I have been very careful in keeping them pure. I procured the original stock from parties whom I knew were trustworthy, and who only grow one variety. I have made inquiry, and can trace their origin for more than seventy years. The potato variety I have only had for two years, of the stock that gained the first prize at the Royal Northern Seed Show in Aberdeen in 1858. The Kildrummy oats are of the stock that gained the first prize at our own local show, and the first at the Royal Northern last spring.

The quantity of seed sown per acre:—Lot first, Kildrummy oats, 3 bushels and 2 pecks, 41 lb. per bushel; Scotch Birley, 3 bushels and 3 pecks. The other two kinds all the same quantity as the last mentioned, and same weight. Eighteen inches were left clear between each kind, in order that each should be kept perfectly separate from the other. When harvesting the crop, I found that distance perfectly sufficient.

All the kinds showed braird about the 10th of May, and by the 26th looked beautiful, and as thick and regular as could be desired. 26th of June, no perceptible difference between any of the lots, but in about ten days after a marked change appeared in the first and last lots, which clearly took the lead as to abundance of straw. By the 16th of July, much the same, except the Scotch and English, the second and third lots, which appeared to be at least ten or twelve days earlier than the Kildrummy and potato, by showing

ear about the 1st of August; the first and last lots about twelve days later; no other difference worth particularising between any of the lots, being much laid and twisted, especially the Kildrummy.

I commenced harvesting the different lots on the 23d and 24th of October; all weighed on the steelyard as it was taken from the field on the 27th and 29th of October; each kind carefully stacked by itself as it was weighed; all thrashed between the 16th and 20th of November; the heavy and light grain dressed, measured, weighed, and deducted from the gross produce; the thrashing machine being carefully cleaned in testing each variety.

No doubt, this was an unfavourable season for trying an experiment, but I have very often seen the heaviest crops when sown in the middle of April. I think it will be readily admitted that from no other source can the agriculturist acquire so practical a knowledge of how to select the most suitable varieties for the soil he occupies, as from experiments carefully conducted on different soils and situations. I find the Kildrummy oats best adapted for light early soils, but if long sown in the same soil, they soon degenerate, and become very hairy, and not at all an attractive sample. As it yields more straw than any other variety, I always sow it in my lightest land, unless when they begin to degenerate, when I sow them on strong clay land, which has the effect of cleaning it of hair, and restoring the grain to its original plumpness. It generally produces from 4 to 8 quarters an acre, according to soil and situation, and weighs from 40 to 43 lb. per bushel. It, however, must be classed among the late varieties, and is not suitable for late districts. The Scotch Birley oat is a universal favourite, is suitable almost for any soil or climate, producing always a fair return both of grain and straw of good quality; about the same return, according to circumstances, as the Kildrummy oat, except the quantity of straw. The English Birley is also an early white thin-skinned variety, and although it is the prettiest sample of all the varieties that have come under my notice, yet I find it is not so productive as any of the other kinds I have used. It answers best on good land after turnips, produces from 4 to 6 quarters an acre, but is generally heavier grain. The potato oat I am not so well acquainted with, having had it only two years; and all that I can say about it is, that it is only suitable for a good soil and early situation, but where this exists I believe there is not a more productive oat. I find it requires exactly the same time to ripen as the Kildrummy oat, as I had them grown last year side by side in the same field. I have tried several other varieties, but have given them up as not profitable—namely, sandy oats, early Angus, and Hopetoun. Sandwich and late Angus oats are very much esteemed in some parts of the north of Scotland.

TABLE SHOWING THE RESULTS OF THE EXPERIMENTS.

	Gross weight per Imperial Acre, as weighed from the Field.			Quantity of heavy Grain per Acre.			Weight per Bushel.	Price per Quarter.			Marketable Value of Dressed Grain per Acre.			Light Oats per Acre.	Weight per Bushel.	Value per Acre.			Weight of Straw and Chaff per Acre.			Rate per Cwt.			Value of Straw and Chaff per Acre.			TOTAL VALUE PER ACRE.		
	cwts.	qrs.	lb.	qrs.	bush.	lb.	lb.	£	s.	d.	£	s.	d.	bush.	lb.	£	s.	d.	cwts.	qrs.	lb.	£	s.	d.	£	s.	d.	£	s.	d.
Kildrummy Oats, Lot No. 1,	53	0	26	4	2	16	39	1	0	0	4	6	0¼	4½	31	0	6	2¼	40	0	0	0	1	6	3	0	4½	7	12	7
Scotch Birley Oats, Lot No. 2,	46	2	6	4	2	14½	40½	1	1	6	4	12	4	2	33	0	3	3	33	2	5	0	1	6	2	10	3¾	7	5	10¾
English Birley Oats, Lot No. 3,	44	3	26	4	0	9½	40¼	1	1	3	4	5	7¼	3	33	0	4	10½	32	2	2	0	1	6	2	8	9	6	19	2¾
Potato Oats, Lot No. 4,	51	0	8	4	0	15½	40	1	1	0	4	5	0	4	30	0	5	6	38	1	21	0	1	6	2	17	7¾	7	8	1¾

PROCEEDINGS IN THE LABORATORY.

By THOMAS ANDERSON M.D., F.R.S.E., Chemist to the Society.

ON THE COMPOSITION AND FEEDING VALUE OF THE STRAWS OF THE CEREALS.

NOTHING is more striking than the increased importance which straw has acquired in the modern practice of agriculture as a food for fattening cattle. Under the old system it was employed almost entirely as fodder, and when it was occasionally added to turnips, it was given less with the idea of any advantage to be derived from the nutritive matters it contained than with the view of correcting the too watery character of that root, and thus facilitating rumination, promoting digestion, and rendering it more valuable. In many parts of the country the propriety of using it in this way even was questioned, and it was never resorted to except in times of scarcity, when other and more nutritive food could not be obtained. Nor is this opinion at all surprising. We are in the habit of considering the moister and more succulent varieties of food as the most nutritive, and with them the dry and woody straws contrast unfavourably; but they do so, not so much on account of the absence of nutritive matters as on their less available condition due to the large amount of woody fibre by which they are protected from the action of the gastric juice, and enabled to pass through the animal in an undigested state. Hence it is that straw, when used alone, must be described as comparatively an innutritious food, and was naturally and justly considered to be inferior to hay, which, in the last century and the earlier part of this, was the staple food of fattening cattle. At that time the amount of the hay crop was in fact the measure of the number of cattle which could be fattened on any farm; but the turnip immediately increased this number, and as its cultivation could be extended more than the hay crop, and the increasing price of meat added to the profits, it was pushed to its extreme, and it then became necessary to use straw to mix with the watery roots. As the advantages of this course became obvious, both in the increased quantity of fat stock, which could be sold off the farm, and the abundance of manure it afforded for the other crops, every inducement was offered to persevere in it, and the consumption of purchased food commenced and rapidly advanced. As most of these foods are of foreign growth, it was of course profitable to import only those which contain abundance of nutriment within a small weight, and hence again straw became necessary for the purpose of adding to the bulk of these substances, and enabling the stomach to dispose of them in a more satisfactory manner than it would otherwise do; for a very concentrated food which does not sufficiently distend that organ, may pass through the intestines to a great extent undigested.

Such is the history of the use of straw in fattening cattle, and with its extension many questions of interest have arisen. It is now admitted that its nutritive effect is much higher than was formerly supposed, but we are still without any definite information as to its value compared with other feeding substances, such as turnips and the like; and further, as to whether there is any, and what, difference between the straws of the different grains and of the same grain grown under different circumstances. It is generally understood that oat straw is superior to either barley or wheat, and it is also believed that the soil and other circumstances have a very important influence upon their feeding qualities, while it is also possible that there may be an appreciable difference in the straw of different varieties of the same grain. It is sufficiently obvious that a complete reply to all these questions would involve the analysis of many hundred specimens of straw, extending over a considerable period, so as to eliminate the effect of season, which in a single year is very apt to mislead. Still, in the present imperfect state of our information, a more limited inquiry will be of use; and it is hoped that the investigation contained in the following pages may prove an acceptable addition to our knowledge of this important subject.

In carrying out this inquiry it was of primary importance to devise some method of analysis suited to bring out the differences I wished to detect, and for this purpose the ordinary methods employed with oil-cakes, the cereals, &c., and which answer perfectly well for these concentrated substances, are of comparatively little use. They are founded upon the principle of determining the total amount of the different great classes or sections into which the nutritive elements of plants are divided. Thus, for example, in wheat we determine the amount of albuminous compounds, as measured by the nitrogen, of respiratory principles, and of oil, and in this case, when each group actually consists almost entirely of one substance, the information so obtained is amply sufficient. Thus, in wheat, the albuminous matters consist almost entirely of gluten, and the respiratory of starch, and the whole grain is easily digestible. But it is quite otherwise with a straw, where our object is not only to discover what substances are there, but also what proportion of them is likely to be available to the animal, and to be assimilated by it in the process of digestion. It then becomes necessary to separate from one another the assimilable and non-assimilable substances, and this touches upon one of those points in chemical analysis which are in an unsatisfactory and imperfect state, and which require and merit further study. I commenced, therefore, by directing my attention to these points, and bestowed upon them a large amount of time, and performed a number of experiments, the results of which it is unnecessary to detail here. The general conclusion to which I came was, that though it might be possible to devise processes by which the proximate principles

might be separated in some substances, it would not be practicable in all. Moreover, it did not appear that the separation of each of these compounds would throw any clear light upon their relative digestibility, and that, in the present state of our knowledge, it would be better, as well as safer, to restrict ourselves to a more limited analysis, though still more complete than those usually made.

It is obvious that if a food contains a considerable quantity of any nutritive element, as albumen, for example, but from some peculiarity in the condition in which it is present, only a portion, say a half or a third, can be assimilated, the value of the food is to be measured by that portion only, and not by the whole. The more nutritive foods are valuable not merely on account of the large proportion of useful substances they contain, but also because they are easily accessible to the animal. Thus in the turnip by far the greater part of its nutritive matters is soluble in water, little more than two per cent of its weight being insoluble in that fluid, and of this small quantity a considerable proportion is dissolved by the juices of the stomach. In the cereals, although but a small proportion is directly soluble in water, the chemical changes they undergo during digestion convert them easily into a condition in which they can be absorbed. But it is quite otherwise with straws. In them the chief nutritive matters are partly soluble and partly insoluble in water, and they contain besides a large proportion of inert woody fibre. It will be easily understood that the substances soluble in water will be readily assimilated by the animal; and even those which are insoluble might, and probably would, also be taken up if it were not for the woody fibre which surrounds and protects them, and if it does not altogether prevent, must certainly greatly diminish the chances of their utility. Even in the most valuable food but a small proportion of the nutritive matters present is assimilated, and it does not admit of a doubt that the portion soluble in water, or that which is most readily converted into a soluble state, will alone be absorbed.

In straws, it may be fairly anticipated that the soluble part only is likely to be of use, and that the other portion, though it may, *if* rendered soluble, become useful, is so thoroughly protected from the action of the gastric juice by the woody fibre in which it is enveloped, that in all probability it generally, if not invariably, escapes assimilation. In consideration of these facts it appeared to me that all necessary requirements would be fulfilled by determining separately the quantities of each group of nutritive elements contained in the straws which are soluble and insoluble in water.

In following out this view of the matter, I at first attempted to effect the separation by macerating the straw in cold water, but it was soon found that in this way only a small quantity of soluble

matters could be obtained, unless they were left in contact for a long time, and then a species of fermentation was apt to occur, which entirely altered the straw, and defeated the object in view. On the other hand, boiling water was inapplicable, owing to its producing coagulation of some of the albuminous compounds. After some trials a temperature of 140° Fahrenheit was adopted, and was found sufficiently high to insure the extraction of all the soluble matters, without running the risk of rendering any of the albuminous compounds insoluble. The first fluid obtained in this way, by adding to the straw about ten times its weight of water, was brownish coloured and slightly mucilaginous, and contained the greater part of the soluble matters. Three or four subsequent additions of water were found sufficient for their complete extraction. The total amount of soluble and insoluble matters was thus determined, and the proportions of soluble and insoluble albuminous compounds were ascertained by determining the total nitrogen and the amount left in the insoluble matter. Owing to the bulky nature of straw, and the small proportion of nitrogen, this required very great care, and duplicate experiments were made, with closely corresponding results.

Wheat Straw.—Samples of wheat straw of good ordinary quality from East Lothian and from the neighbourhood of Midhurst in Kent, have been examined.

	Mr Harvey, Whittingham.	Mr Scot Skirving, Camptown.	Kent.
Soluble in water—			
Respiratory elements,	2.68	6.68	5.26
*Albuminous compounds,	0.86	0.37	1.37
Ash,	3.38	1.55	4.97
Insoluble in water—			
Oil,	0.80	1.00	1.50
Respiratory elements,	44.88	36.43	38.79
†Albuminous compounds,	0.51	1.12	1.00
Woody fibre,	32.88	34.78	35.01
Ash,	2.82	6.49	1.35
Water,	10.62	10.93	11.15
	99.43	99.35	100.39
*Containing nitrogen,	0.139	0.06	0.220
†Containing nitrogen,	0.082	0.18	0.160
Total nitrogen,	0.221	0.24	0.380
,, albuminous compounds,	1.37	1.49	2.370
,, respiratory elements,	47.56	43.11	44.050

In examining these analyses, it is impossible to fail being struck by the small proportion of matters soluble in water which wheat straw contains. Excluding the ash, they amount in the first sample to no more than 3½ per cent, and in the other two to 7 and 6½ per cent respectively. To these the large proportion of soluble ash form a very remarkable contrast, in two of the samples greatly exceeding the insoluble ash, and in the third (that from Camptown), though it falls short of the insoluble part, it must still be looked upon

as proportionately large. The largest individual constituent in all these straws is the insoluble respiratory elements, and they materially exceed the woody fibre in quantity, a result for which I was not prepared. It is interesting to notice that, if we take the total albuminous and respiratory compounds, the difference between the specimens is by no means large, and the two East Lothian straws in particular are almost absolutely identical. It is only when the relative quantities of soluble and insoluble matters are taken into account that the difference becomes apparent.

Barley Straw.—Samples of barley straw were obtained from the same localities as the wheat straw, and are here distinguished as numbers 1, 2, and 3:—

	No. 1.	No. 2.	No. 3.
Soluble in water—			
Respiratory elements,	3.22	6.11	4.56
*Albuminous compounds,	1.42	0.39	0.66
Ash,	3.30	2.87	3.38
Insoluble in water—			
Oil,	0.97	0.88	1.05
Respiratory elements,	35.56	38.38	27.95
†Albuminous compounds,	1.54	1.12	1.98
Woody fibre,	41.34	36.62	47.53
Ash,	0.91	2.75	1.47
Water,	11.44	11.15	11.10
	99.70	100.27	99.68
*Containing nitrogen,	0.228	0.063	0.106
† „ nitrogen,	0.247	0.180	0.317
Total nitrogen,	0.475	0.243	0.423
„ albuminous compounds,	2.960	1.510	2.640
„ respiratory elements,	38.780	44.490	32.510

In these samples the differences are far from inconsiderable. In the first the total percentage of albuminous compounds is about twice as great as in the other two, and it is nearly equally divided between the soluble and insoluble. In both the others the proportion of insoluble albuminous compounds exceeds materially the soluble. The total quantity is also larger than in any of the wheat straws, and there is likewise a considerable difference in the amount of respiratory elements and fibre, the latter varying from little more than one-third of the entire weight of the straw, in No. 2, to nearly a half in No. 3. It cannot be doubted that these differences must tell on the nutritive value of the samples, and that the first would, under ordinary circumstances, prove the most valuable, and the third the least so.

Oat Straw.—Owing to the greater importance of oat straw, and its generally admitted superiority as a feeding substance, a larger number of analyses have been made of it than of the other grains.

	Sandy Oat straw —Mr Skirving	Sandy Oat straw —Mr Harvey.
Soluble in Water—		
Respiratory elements,	10.12	6.90
*Albuminous compounds,	0.40	1.03
Ash,	3.97	5.01
Insoluble in Water—		
Oil,	1.45	0.77
†Respiratory elements,	33.52	34.77
Albuminous compounds,	0.93	0.43
Woody fibre,	35.36	38.73
Ash,	2.39	1.27
Water,	11.70	10.95
	99.84	99.93
*Containing nitrogen,	0.064	0.170
† „ nitrogen,	0.140	0.090
Total nitrogen,	0.204	0.260
„ albuminous compounds,	1.16	1.56
„ respiratory elements,	43.64	41.67

	Mellhill, Inchture.	Midhurst, Kent (white one side.)
Soluble in Water—		
Respiratory elements,	12.01	6.23
*Albuminous compounds,	0.95	0.33
Ash,	1.60	1.92
Insoluble in Water—		
Oil,	1.60	1.00
Respiratory elements,	23.35	30.95
†Albuminous compounds,	1.21	0.33
Woody fibre,	45.27	47.40
Ash,	2.35	1.70
Water,	11.70	10.55
	100.14	100.41
*Containing nitrogen,	0.156	0.052
† „ nitrogen,	0.211	0.052
Total nitrogen,	0.367	0.104
„ albuminous compounds,	2.27	0.66
„ respiratory elements,	35.36	37.18

	Oat straw, grown at sea-level, East Lothian.	Oat straw grown 850 feet above the sea-level, East Lothian.
Soluble in Water—		
Respiratory elements,	7.16	7.42
*Albuminous compounds,	0.67	0.92
Ash,	3.84	2.91
Insoluble in Water—		
Oil,	1.25	1.36
Respiratory elements,	24.18	29.55
†Albuminous compounds,	0.38	0.39
Woody fibre,	48.94	44.40
Ash,	1.27	2.16
Water,	12.60	11.28
	100.29	100.39
*Containing nitrogen,	0.108	0.150
† „ nitrogen,	0.062	0.063
Total nitrogen,	0.170	0.213
„ albuminous compounds,	1.150	1.310
„ respiratory elements,	31.340	36.990

These analyses fully justify the preference accorded to oat straw in feeding, for all of them show a larger, and most of them a much larger, proportion of soluble matters, than either wheat or barley. There is, however, a very great difference between the samples; that from Millhill, containing nearly twice as much soluble as some of the others. If this be taken as a measure of their relative values, then we should be induced to place that sample, and the sandy oat straw from Mr Skirving, on a considerably higher level than any of the others; while that from Kent would stand lowest. And this conclusion is justified by practical observation. In fact, the specimen from Kent was sent me by Lord Kinnaird, for the purpose of ascertaining whether there was any difference in the composition of it and of the straw grown on his home-farm at Millhill, because he had found a very material difference in their feeding properties. The straws grown at the sea level, and at 850 feet above it, were analysed for a similar reason; it having been stated by Mr Harvey of Whittingham Mains, that there is believed to be a difference in their feeding qualities. The analyses scarcely bear out this opinion, as far at least as these two samples are concerned, for though that from the high level is slightly superior to the other, the difference is so small that no conclusions can be drawn from it; indeed, specimens from different localities vary to a much greater extent.

Passing from these points to the more general considerations regarding the nutritive properties of straw, it must be observed that their value is much higher than might have been expected. The position in which they stand may be best rendered obvious by a comparison with the turnip. That root contains on the average from 1.2 to 1.4 per cent of albuminous compounds, and 4 or 5 of respiratory elements, of which 3 or 4 are soluble in water. It will be observed then, that, as far as nutritive matters are concerned, straws generally stand far above the turnip, surpassing it slightly in the albuminous, and enormously in the respiratory elements. As a source of these elements they must hold a very high position, and in this respect are surpassed only by the grains and some few other substances. When compared with roots and grains, however, a very marked difference may be observed between the relative proportions of these two great classes of nutritive elements. The ratio of the albuminous to the respiratory compounds is, in the turnip, as 1 to 3 in round numbers, and in the grains as 1 to 7. That is to say, for every pound of albuminous compounds contained in a grain, as wheat for example, there will be about 7 pounds of respiratory compounds. In the straws, the proportions are very different, the total respiratory compounds being never less than 10, and sometimes nearly 30 times as abundant as the albuminous. If the soluble portion of these substances only be considered, then the ratio approaches nearer to

that observed in the more concentrated foods, though on the whole the excess of respiratory elements is very marked.

Returning now to the comparison between the turnip and straws, it is obvious that though the latter greatly exceeds the former in the amount of substances which *may* be absorbed, no one would for a moment think of asserting that straws are therefore of greater nutritive value. The reverse is undoubtedly the case, and the cause of this is to be found in several considerations. *1st,* It must be attributed in part to the unsuitable proportion of those classes of nutritive substances: for if highly nutritive substances, such as the turnip and grains, contain a relatively much larger proportion of albuminous compounds, then it may be expected that in the straw the small quantity of these substances will cause the assimilation of only a proportionate quantity of the respiratory elements, and the surplus will be wasted. Hence also the use of highly-nitrogenous foods, such as oil-cake and bean-meal, along with straw, must be considered good practice. *2d,* It may be fairly anticipated that the insoluble portion of the nutritive matter will in general be of little, or possibly sometimes of no use. *3d,* Owing to the difficulty with which the soluble matters pass into solution in water, a considerable part of them may escape digestion. And in this respect the contrast between straw and turnip is very marked. In the latter the larger proportion of the constituents are not only *soluble,* but already *dissolved* in the 90 per cent of water present; but in the former they are not dissolved, but are in the solid state in the dry straw, and must undergo the process of solution, which is effected during mastication and rumination. The difficulty of dissolving the soluble matters of straw in cold water has been already adverted to, and even when warm water is used the process is slow, and requires considerable time. From this it may be concluded that straw ought to be well moistened and steamed before being used. *4th,* The large proportion of woody fibre existing in all straws must interfere materially with the production of the full effect of its nutritive elements.

Notwithstanding these drawbacks, the general conclusion to be drawn from this inquiry is, that straw, and more especially oat straw, possesses a very considerable nutritive value, but that it is most advantageously used along with the more highly nitrogenised foods. It must be observed, also, that, in a mechanical point of view, it may even have its uses in the intestines, and by giving bulk and firmness to the mass of food contained in them, assist the process of digestion and absorption. Such are the conclusions to which analysis leads; and I will only add, that a minute and careful series of feeding experiments with straw, under different circumstances, would be a great boon to practical agriculture.

ON THE EFFECTS OF THE SEVERE FROST OF DECEMBER 1860 AND JANUARY 1861 ON TREES AND SHRUBS.

By ROBERT HUTCHISON, of Carlowrie, Kirkliston.

[Premium—The Medium Gold Medal.]

THE winter of 1860-61 will long be remembered by arborists on account of its severity. It is generally admitted that the frost of December and January was the most intense that has been experienced in this country within the memory of the present generation, and much damage was sustained by trees and shrubs of all descriptions and ages; many of the varieties being of somewhat recent introduction, were perhaps on that account less able to withstand the extreme vicissitudes of our northern climate. The injury may therefore be supposed to have been extensive, in some particular localities unprecedentedly serious, and at all events for many years to come utterly irreparable.

In the course of our investigations into this subject, the geographical distribution of the frost was found to be wide, but varied in its intensity. The frost in some instances had proved so capricious in its effects upon the same species of plants at similar elevations, that we deemed it would form an important addition to this report, if returns of the effects produced on different varieties of trees and shrubs in various soils and exposures, from a range of elevations in different parts of Scotland, and obtained from reliable sources, could be collected. After considerable delay, a sufficient number of these has been obtained, and they have been as far as possible classified, tabulated, and are appended hereto. They number in all ninety-two schedules or reports from various altitudes in different counties; and the information they convey may hereafter prove useful for comparison and reference, the geographical distribution of the memorable frost of Christmas 1860, its ravages and its intensity, being accurately ascertained and recorded. The lowest indication of the thermometer is in most cases given; but in this some allowance must be made for the variety and differences of exposure and instruments, as well as other circumstances. The average depth of snow at most of the stations has also been added.

Before entering into detail upon the effects of the frost, we may be allowed to call the attention of proprietors in Scotland to the desirability of each knowing the elevation of his residence above sea-level, and of having his grounds supplied with an accurate thermometer, intrusted to the care of an intelligent gardener or labourer. It will perhaps be hardly credited that, in the present age of advancement in agriculture, arboriculture, as well as in meteorological science, there should be so many proprietors who neither know the altitude of their properties above sea-level, nor

possess any thermometer, far less keep any accurate register of the weather! A reference to the Ordnance Survey maps, now so far advanced in publication, would supply the one, and an outlay of a very few shillings would remedy the other.

The seared and withered remains of many of our common and familiar roadside plants and bushes, such as whins and broom, tell the tale of the unparalleled degree of cold which must have been experienced ere these ordinarily hardy denizens of our soil could have become so much destroyed, and render the past winter one of most memorable and rare occurrence.

Had the frost, however, been even less severe than it was, vegetable life generally was more than usually liable to suffer from its effects, owing to its condition consequent upon the existing state of the weather for some months previous to the setting in of the storm. It has been observed that *intense* frosts seldom take place till the earth is completely glutted and chilled with water. Such was the case in the very severe winter of 1768, when in the county of Rutland 6½ inches of rain fell in the month of September. Again, in the autumn preceding the winter of 1776, and likewise in December 1784—both years rendered memorable by the severity of the winter's frost—the weather was previously wet. It cannot, therefore, be considered singular that last year the same thing occurred in a very remarkable degree; the summer was wet, with comparatively little sunshine and continued low temperature. This damp humid state of the atmosphere continued at intervals during the autumn months, and until the middle of December the weather was unseasonably "*open*" and mild. The growth of the year's wood upon shrubby and hard-wooded plants and trees was thereby of more than average length; and the sudden transition from the rainy weather of October and November to the severity of a sharp frost on the 18th and 19th December, found the shoots, especially upon plants in low-lying situations, and growing in rich soils or near streams of water, unripened, not sufficiently hardened, and consequently in a state less able to withstand the frosts of a severe winter, far less the rigour and intensity of such a season as that of 1860-61 proved to be. The change in the temperature referred to, about the middle of December, was general; the frost became suddenly very intense, and a heavy fall of snow taking place at the same time in many places, particularly along the east coast,* to the depth of about two feet, at once presented the appearance of winter in earnest. The snow continued at intervals of short duration till the 23d; there was little or no wind, any slight breath being from points ranging between east and north. The 24th was one of the coldest days experienced; the thermometer had fallen in some places to hitherto unregistered

* In Argyleshire, "*None*" is reported. *Vide* Appendix, Return No. 70.

indications. "*Below zero*" previously seemed very low; but to find in several instances –12°, –11°, –10°,—as, for example, at Barrochan in the county of Renfrew, Stobo Castle in Peeblesshire, Oxenford Castle, Mid-Lothian; Invercauld, Braemar; besides many other localities, — shows a state of matters hitherto perfectly unprecedented. Again, on the 27th, a very low indication is in many places reported; and upon these two days the greatest amount of cold seems to have been experienced; and to the intensity of the frost on these occasions we are inclined to attribute much of the damage done to trees and shrubs.

But not to the frost alone must we ascribe all the loss our shrubberies have sustained, other accompanying circumstances in some cases contributed to the devastations; and the easterly "*haar*" which afterwards prevailed, loading the atmosphere in situations exposed to its effects, materially aided, we may suppose, in injuring many of the evergreens and pines, whose foliage, in their already weakened condition, rendered them an easy prey. At Gordon Castle, Morayshire, elevation from 70 to 80 feet above sea-level, the lowest indication of the thermometer was only +4°, and considerable damage was done, *less*, it is believed, by the actual severity of the frost, than by the accompanying moisture of the atmosphere, which was little else than hoar-frost.*

It may be here stated as worthy of note, that during the period of the most intense cold the greatest amount of snow was lying; and likewise, that most snow will generally be found to have fallen where the thermometer indicated lowest. On reference to the Appendix of Returns, it will be found that along the western side of the watershed of the country — for example, at Kilmory in Argyleshire, Montford in Bute, Ardchattan, &c.,—while the thermometer ranged much higher than at many places on the eastern slope, there was also little or no snow; and at many stations on the eastern slope, where the frost was most intense, the greatest amount of snow had fallen. Had the case been otherwise, the damage would, doubtless, have been far greater.

The beneficial effects upon vegetable life during severe frost of a good snow covering are well known. The snow in some measure maintains the soil at the temperature at which it happens to be when it falls; but under certain circumstances there are disadvantages arising from it. During last winter the smaller specimens, wholly covered and protected by snow, have, of course, been almost universally preserved, while larger and older plants of the same species have in many instances been "*killed to snow line.*" In several cases, however, large branches of some varieties of pines and cedars, being completely borne down by the mass of snow, have been broken by the superincumbent weight, thus injuring the

* *Vide* Appendix, Return No. 74a.

plant, and utterly destroying its appearance. Examples of this kind, in which common hardy spruces have been disfigured, occurred at Scabboch Castle, Aberdeenshire.* and at other places. We have further observed, that in some localities, generally with a southern aspect, where the snow fell, and from exposure to the sun's rays during day succeeded by frost at night, became a hard and crystallised mass upon the foliage and branches, many shrubs—Aucuba Japonica in particular—have suffered severely. Instead of deriving benefit, therefore, from the covering, they were seriously injured, and have sustained more damage than if there had been no snow at all. Similar instances of destruction during the frost of January 1768 are noticed by White in his 'Natural History of Selbourne,' where he states that, "in sheltered situations, the snow on his evergreens was melted every day and frozen intensely every night, so that the lauristinus, bays, laurels, and arbutuses looked, in three or four days, as if they had been burnt in the fire; while a neighbour's plantation of the same kind, in a high cold situation, where the snow was never melted at all, remained uninjured.†" It may therefore be suggested, that in cases where snow has acquired an icy and crystallised state upon the foliage and branches of any shrubs, it should be carefully shaken off, or brushed away, otherwise the cellular tissue of the young wood may be so damaged and ruptured by the expansion and contraction, as to kill the specimen entirely, or, at all events, to destroy it for several years. In no case should snow be removed when lying in a perfectly soft and pliant state, or the very consequences sought to be avoided will certainly be incurred. The more tender and delicate varieties should also be placed in situations where they are not liable to be subjected to the sun's rays in winter, for in *back-lying* situations they are less prone to push away young wood early in the season, or to continue growing on late in autumn, rendering them thus more hardy, and likely to endure with impunity to the young shoots the winter's severity.

Proprietors and others cannot be too carefully warned, in clearing out their ornamental belts and shrubberies, of the evil consequences of too severe thinning at one time, especially at the commencement of winter. Many, from mistaken motives of economy, or to remove specimens, or to transfer nurses to other situations, fall into this error; and in such a winter as last, or even in a moderately severe one, the results are far from satisfactory. We have noticed that upon several spots which had been thinned, and the huddled plants transferred to more airy and open spaces in the fall of last year, the severity of the frost was experienced in a most grievous degree. The plantations which had been thinned, and

* *Vide* Return, No. 81.
† 'Natural History of Selbourne,' p. 289, Bohn's Edit., 1854.

the plants which were removed, chiefly spruces, silver firs, and Weymouth pines, from three to four feet in height, having alike suffered by the withdrawal of the shelter they had mutually afforded each other; and it would be well for any contemplating operations of this kind to delay the execution of them till spring—say March or April—rather than proceed with them in the open weather of November, or close of the year. Indeed, we have almost invariably observed that coniferæ transplant most successfully towards the end of April. Mr Baxter, the intelligent gardener at Riccarton, remarks, in the very full return of the losses sustained in the grounds under his charge during last winter, that those plants of Portugal laurels which he had transplanted in spring or last autumn suffered severely from the storm, while those removed at midsummer were little injured.

We find, in most instances, that plants and trees upon poor soils, with dry well-drained subsoil, and at moderate or even high elevations, have, generally speaking, stood much better than those in richer mould in low-lying or well sheltered situations. At Belstane, Midlothian, for example (700 to 900 feet elevation), near the Pentland Hills, and on a thin soil, little or no damage has been sustained; while not far distant, at Craigpark, near Ratho, at 400 feet elevation, and in a rich soil, the effects of frost have been severely felt. In the low-lying portions of this property the damage is far greater than in the higher part of the grounds. Again, at a still lower level, with an equally rich and heavy soil, at Carlowrie, on the borders of Linlithgowshire, at 92 feet elevation, the ravages by the frost have been fully more severe.* The reason of this is obvious, taking into account the previous state of the weather before referred to. Shrubs and trees in poor soil, receiving less nourishment, throw out a less luxuriant growth of young wood annually than the same species in stronger loam, and the wood is thereby better and earlier ripened, and less liable to injury from frost. But, it may be said, this is no doubt true of plants in *poor* soils, as contrasted with those in *richer* loam; but why should those species in low-lying sheltered nooks be more cut up than the very same species reared on a higher and colder elevation? The explanation of this is found in a law of nature, which has only recently become generally understood. On reference to the Appendix, it will strike the reader, that in most cases a lower temperature is found in the lower elevations; while in many of the higher altitudes the cold has not been so intense. For the sake of comparison, and to satisfy the curious, the following table is prepared from the returns in neighbouring or corresponding districts, and illustrates the truth of what we have stated.

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* *Vide* Appendix, Returns Nos. 2, 6, and 14.

Name of Station.	Altitude in feet.	Degree of frost.	Injury to plants.
Riccarton, ...	300	+ 6°	A good deal.
Clermiston, ...	300	+ 4°	Little.
West Coates Nursery, .	250	— 1°	Considerable.
Hanley, ...	150	— 6°	Very severe.
Carlowrie, ...	92	— 9°	Very severe.
Ochtertyre, . . .	366	+12°	Very little.
Lanrick Castle, . .	300	+ 3°	A good deal.
Blairdrummond, . .	100	— 2°	Considerable.
Greenock Cemetery, .	307	+11°	Almost none.
Elderslie, ...	10 to 20	— 6°	Considerable.
Blythswood, . . .	6	— 9°	Very severe.
Cargen, ...	80	0.4°	Severe.
Ginoch, ...	40	Zero.	Severe.
Taymouth Castle, .	370	+ 6°	Very slight, if any.
Dunkeld, ...	180	+ 4°	A good deal.
Pitfour, ...	78	+ 3°	Considerable.
Tulliallan Castle, . .	50	+ 2°	Considerable.
Conypark, ...	50	— 5°	Severe.

An explanation of this will be found in the Scottish Meteorological Society's Report for the quarter ending 30th December 1860, in a paper translated from an article by M. J. Tournet in 'Annales de Chemie,' t. lxxii. p. 312, 1839 ; as also in other papers in the same number of that Report, and to which we may be permitted briefly to allude.

Radiation during clear nights often takes place rapidly, and if we for a moment assume it is progressing over the whole surface of any district equally, its effects, nevertheless, will not be experienced in every situation *in the same degree*, because the air in contact with the colder ground (which loses heat faster than the air) acquires greater density, contracts and floats down by the force of gravity in a thin stratum from the more elevated situations along the surface of the ground, and is thus gradually accumulated in the lower and *apparently* more sheltered situations. Instances occurred during the frost of last winter proving this in a most unmistakable manner. For example, two Portugal laurels growing on the banks of the Clyde, near Orchard,* at a distance from each other of about 100 yards, but, in other respects, in similar circumstances, were very differently affected during the storm. The larger plant,

* Appendix, Return No. 38.

about 18 feet in height, which was also further up the slope, is perfectly safe; while the other, about 12 feet high, but lower down the valley, was killed to the root! Again, in the same district, at an altitude of 220 feet, we find furze or whins killed; while at 560 feet elevation, under otherwise similar circumstances, they are perfectly unscathed. Instances, however, occur which seem to form exceptions to this law, and these we are quite unable to account for, unless we refer our difficulty to something existing in the plants themselves, some weakness in the constitution of the specimen, or liability to suffer from frost, but which, in the outward appearance of the plant, may not be perceptible. It is quite possible that one tree or shrub may be physically healthier and hardier than another of the same species in the same situation, and may consequently survive the intensity of a storm, just as we find one man healthier, or hardier, and more able than another to endure fatigue or exposure under similar circumstances. If one or two examples which we shall now quote from our returns cannot be accounted for in this way, we fear we are unable to assign another reason for the capricious working of the frost in such instances.

1°. At Keir gardens, near Dunblane, only two plants of Cedrus Deodara, amongst several hundreds, were destroyed.

2°. Pinus Insignis, also at Keir, 20 feet high, in loam, on rocky subsoil, *is killed;* while the same species, 30 feet high, in loam, on tilly subsoil, is little injured!*

3°. Mr Morrison, of the Pinefield Nurseries, near Elgin, an intelligent observer, writes, towards the end of June, that he had been taken to examine a plant of *Arbutus Unedo,* which was supposed to be dead, and which he found to be the case. The plant was about 4 feet high, and stood in front of a high house with a western exposure; "*the stem was split up and the plant killed.*" Within 30 yards of this very plant, and with the same exposure, being in front of another house in the same line of buildings, was another *Arbutus Unedo*, of the same size and age (both plants were supplied at the same time from Mr M.'s nurseries about ten years ago), quite sound and untouched by the frost!

Numbers of similar instances might be adduced, but we think those we have now mentioned are sufficient at least to warrant the supposition that, unless in the plant itself there be some predisposition to disease, or weakness in its organisation, such cases cannot be accounted for on any general ground, or as arising from any other apparent cause.

There can be no doubt that in situations and under circumstances calculated to develop the rapid growth of young wood, or to induce a luxuriant habit in the plant, the damage has been much greater than in other and less favourable circumstances. Below

* Appendix, Return No. 67.

the shade of old trees, which during an ordinary winter would have assisted in screening and sheltering shrubberies from the severity of the weather, it appears that in many localities, chiefly at low elevations, the frost committed great havoc, the growth of last season being in such circumstances very imperfectly ripened, and consequently less hardy. Again, in districts adjoining lochs, or near rivers, the effects of the frost have been, if possible, even more severely felt. Take, for example, Valleyfield, near Culross, with only a few feet of elevation above the Firth of Forth,—shrubs there have been much more seriously injured than those in neighbouring localities otherwise similarly situated, *probably from the fact of a stream flowing through the grounds.* At Wauchope, in Roxburghshire, elevation 600 feet, Portugal laurels are quite sound near the house; while at the garden, about 50 feet lower, *and near a rivulet*, these and other shrubs have suffered very severely. At Kinross and Lochleven, also, a much greater amount of damage has been sustained by trees and shrubs than in those districts of the parish of Orwell, from 50 to 60 feet higher.* This goes further to prove the law of difference in the degree of temperature with the altitude already referred to, a very remarkable instance of which was noticed at Ochtertyre, near Crieff. Along the course of the river Earn, and about 200 feet lower than the mansion-house of Ochtertyre, the thermometer generally indicates during frost 10° *lower* than it does at Ochtertyre House.

Having thus far discussed the general effects of the frost upon trees and shrubs at different elevations, and under different circumstances, whether of situation, shelter, soil, or other peculiarity, let us now examine some of the injured plants themselves, and observe the manner in which they have been affected. The first peculiarity we notice is *the splitting of the stem and bark.* This is by no means a new feature of the effects of severe frost. The effects of that intense storm of 1683-84, are, in this particular, pretty much like those of last year; and we further learn that in low situations then, more injury was sustained than in the higher altitudes. Evelyn, in his Diary, says:—"It was a severe judgment on the land, the trees not only splitting as if lightning-struck, but men and cattle perishing in divers places. . . . all exotic plants and greens (evergreens) universally perishing."† The same writer, on an examination of his garden in the beginning of February 1684, found "many of the greens and rare plants utterly destroyed. The orange and myrtles very sick, the rosemary and laurels dead to all appearance, but the cypress likely to endure it;" a state of matters, in regard to these very species, much akin to what happened during the late winter.

* Appendix, Returns Nos. 66, 25, and 48.
† Evelyn's 'Diary,' vol. i. p. 248, Colburn's edition, 1852.

Cases of "tree-splitting" are mentioned in several of our returns. Take that instance already quoted, of the *Arbutus Unedo*, mentioned by Mr Morrison, near Elgin. Again, at Ludgate Lodge, near Ratho, elevation 272 feet, and with $-4°$ indication of the thermometer, the stems of Lauristinuses are noticed by Dr Craig in his return as "split." At Riccarton, in Mid-Lothian, with an elevation of about 300 feet, and the thermometer marking $+6°$, the bark of Portugal laurels is "*rent*." Amongst other examples of a similar kind, falling under our personal observation, we select the following:—A large beech-tree, probably from fifty to sixty years old, growing at the eastern corner of a small plantation, and fully exposed to the weather on the east and south-east sides, was rent or split up the weather side, the gap extending from the ground 12 feet up the trunk. The aperture, when noticed, was fully an eighth of an inch apart, and the bark on either side of the wound seemed to be "*rising*" from the wood. After some time, the lips of the opening gradually closed, and during the summer, Nature has quite repaired her injury, for the tree now seems perfectly healthy. Near the same place, cracks and smaller rents were quite discernible on the surface of the ash-bark, and upon other beeches and young poplars; and it is worthy of notice that indications of this kind were only observed upon the smooth-barked trees, probably from their presenting a smoother and more level surface to the weather, as well as from their being more succulent in habit than the others. Similar indications were apparent to a less extent on the branches of apple-trees trained on a south wall. In this situation the lowest register of the thermometer was—10°. Similar effects upon the stems and branches of various other trees might be stated. Upon the horse-chestnut, *scale-like* roughnesses have been developed, rising from the bark, curling up in a few days, and eventually falling off. The *Araucaria Imbricata* in innumerable instances presents a woeful spectacle. Its arms have been shrivelled up, the tips of the side-shoots being generally curled downwards in the most fantastic manner, giving the whole plant a very melancholy and unpromising appearance. Several specimens, however, in the neighbourhood of Edinburgh, we observed in the middle of September to be throwing out young shoots round the neck of the main stem at the ground; but in most places, we fear this pine has proved a sad disappointment. In the case of Portugal laurels, chiefly of large size, and very old plants, the bark has "*peeled off*," like a tree that has been dead for a season, or a trunk which has lain cut for some time; the bark, however, looks rather fresher, but the wood is brown. The rind, and that part of the log which a joiner would call the "*sap-speal*," are totally destroyed.

In cutting over the injured parts of many evergreens, to allow the stools to throw out young shoots, and to apply fresh mould to them, the smell they emitted was frequently most offensive; and

the branches cut, presented an appearance as if they had been partially exposed when green to the action of fire, the wood being blackened and scorched.

Plants and fruit-trees trained upon walls have generally suffered more severely than standards of the same class. On examining the bark and branches of several peach and pear trees—which in the month of May began to wither, having, prior to that season, appeared quite healthy, expanding their leaves as in an ordinary spring time—the bark of last year's growth was found to present a rough and dark-coloured appearance, and upon being cut or scraped, the young shoots were perfectly black in the pith or core; and the entire wood of some few years' growth exhibited symptoms of incipient decay. This was probably occasioned by the severe frost attacking the plant before the sap had gone down the tree, owing to the lateness of the preceding season. On a minute examination of the flower-buds of pears, apples, apricots, and peaches, we have also noticed in many places, where the general appearance of the blossom was "*nizart*," a black speck in the neck of the bud at the stem, which was followed, in most cases, by the blossom falling off—a circumstance arising, no doubt, from the early and suddenly intense frost having injured the tree to such an extent as to debilitate its general condition, and cause it in spring to produce only a weak, puny, and unhealthy blossom. This blackness in the flower-bud stem, and pith of young shoots on pear-trees, was also observed at Carluke, and in several other districts.

A curious instance of the existence of a contractile power in plants was brought under our notice during the frost. One of the largest branches of an old apple-tree grew across and overhung a garden walk, at a height of about six and a half feet from the ground. This branch, about two and a half inches in diameter, during the intensity of the frost, was observed to have drooped about fifteen inches over the walk, and it continued in this state till the return of thaw, when it regained its former position and rigidity. There was no snow or superincumbent pressure to weigh the branch down, and its declension is quite certain, because people passing daily along the walk under it were unable to do so without stooping, from the obstruction it caused during the continuance of the storm. The tree is an old one, and has for several years evinced signs of approaching dissolution. Can it be that this bending arose from the fact of the tree being hardly in a sound or healthy state, and therefore more liable to suffer from the effects of the frost?

In many situations, and those chiefly of a low elevation, the young wood of growth 1861, even upon large full-grown trees of the common oak, is perfectly dead; and in Appendix, Return No. 78, the same fact is noticed from Inverness-shire. Particularly

was this the case with a line of oaks on the Barnton property near Gogar burn, which, when a plantation was cut out about two years previously, were left singly along the road-side. The long-accustomed shelter had given them an unusually delicate habit in throwing out young wood, which has now proved itself unable to resist the severity of the winter.

We come now to notice several districts which appear to have been almost completely exempted from the damaging effects of the winter, or to have suffered in a very modified degree; and we mention first the west coast of Scotland. In every locality and situation this tract has suffered far less than the district to the east. The reason of this is obvious. The entire west coast of Scotland falls directly within the influence of the Atlantic and the Gulf-stream; and the thermometer accordingly indicates on an average a considerably higher range there than in the eastern districts. Again, if there was any slight breeze, either during or prior to the setting in of the frost, it was from points between north and east, which would, doubtless, contribute to the mildness of the climate in the western portions of the island, where the wind and easterly haar which prevailed must have been less felt than in the eastern counties.

Many of the northern districts also suffered (with a few exceptional localities) much less than places in the south or east. Orkney seems to have enjoyed almost absolute immunity from the frost, and this is explained by the fact that the climate there in winter is generally mild, blight being caused to trees and shrubs rather by wind than by frost. At an elevation of forty feet above sea-level, the lowest degree of cold registered in Orkney during winter 1860 was +18°.

The mildness of the climate in this and other *island* districts of Scotland, such as the Hebrides, may be ascribed to the influence which the surrounding ocean has upon the temperature. The mean yearly temperature of the sea we find to be 1.03° warmer than the air; but this result is not final, and we are inclined to consider the mean temperature of both to be equal; in mid-winter, however, the sea is six degrees warmer than the air, and the reverse in midsummer, which, of course, modifies the climate of the north and west islands. Another cause why generally less damage from the frost has been reported from these districts, is probably to be found in the fact of there being few shrubs and trees to be affected. At Westness, Orkney, however, we learn that many evergreens were killed, while no remarkable effects were observed in the gardens of Skaill and Kierfield.

In Uist, Harris, and the outer Hebrides, there is nothing to remark regarding the effects of the frost, which in that quarter was not extreme. The lowest range of the thermometer at Lewis Castle, Stornoway, 120 feet above sea level, was, on 24th Decem-

ber last, + 17°; and in Ross-shire, we believe, trees and shrubs generally did not suffer much.

A very remarkable exemption from the general destructive effects of the storm are Taymouth Grounds. There the damage has been actually *less* than in an ordinary winter, although the thermometer stood at + 6°.* At Invercauld, the damage is reported to have been caused rather by the spring frosts than by the severity of the weather in December and January.† At Dunrobin, Sutherlandshire, Mr Mathieson, who has had charge of the greater part of the plantations in that county for the last thirty years, writing on the 20th May last, says, "he never saw less damage done by frost than last winter."

Individual spots in the same garden or shrubbery have been sometimes almost wholly excluded from the damage done to the same species of plants all around the exempted place, and that without any apparent reason; further, even particular portions of one plant have been injured or affected on the side where the destructive influence might have been least expected to take any effect. At Cliftonhall, in Mid-Lothian, for example (elevation about 300 feet), a line of Portugal laurels, planted along a wall as a screen to it, were completely scorched on the side *next to the wall;* while the other, fully exposed to the sun's rays during the day, and to the influence of the chill at night, escaped uninjured! At Elderslie, Renfrewshire, with a very low altitude, ivy is killed growing upon an open railing; but although hurt, will recover when growing on a wall. Roses, in almost every situation, *on walls*, perished; but the destruction, although very severe and general, is less complete amongst standards, and still less amongst dwarf varieties.

Amid the traces and records of desolation which, after a storm like winter 1860-61, surround us on every side, it is satisfactory to find some species of trees and shrubs which have, generally speaking, proved themselves, on account of their great hardihood, as well as from their prospective utility probably as timber, valuable acquisitions to the arboretum and shrubbery. In the van of these we may be justified in placing the *Wellingtonea Gigantea*, which will scarcely be found, in any situation, or under any circumstance, to have suffered in the least degree. It may be stated, in opposition to this remark, that its comparatively small size, and consequent shelter under the snow, in many cases favoured it to a great extent; but we assert that cases do occur, and appear in several of our Returns, where, rearing itself above snow line, it has braved, *uninjured*, the rigour of the frost; and it is really the only plant of which we invariably receive good accounts, the reports of injury, and that only in a partial degree, being rare exceptions. Upon rich soil, or in deep loam, with a subsoil of a damp tendency,

* Appendix, Return No. 61. † Appendix, Return No. 84.

we expect this plant to prove a rapid grower, and a hardy, elegant, and striking acquisition to our Pinetum. We must also make honourable mention of the Cupressus Lawsonii, another Californian variety, which, in addition to evincing great hardihood in many and varied localities, at Oxenford Castle, Mid-Lothian (elevation 450 feet), with the thermometer close to the ground at its stem indicating – 10°, stood perfectly uninjured.

Thujopsis Borealis, and Thuja Gigantea have also, in nearly every instance, sustained little or no injury. Cedrus Deodara and Cedrus Atlantica have been, in almost every case, more or less touched, especially in the foliage; but, generally speaking, the pines have suffered comparatively less than one would have imagined, judging from their recent introduction, and taking into account the promiscuousness with which they have been chosen, without reference to their capabilities for the situations in which many of them have been placed, or the nature of the soil into which they have been planted.

Evergreen oaks, Portugal and Bay laurels, Aucuba Japonica, and Hollies, have all, in seven cases out of ten, perished; and, amongst the lost, fall to be numbered many rare and large specimens, which it will require a lifetime to replace.

At Hamilton Palace, laurels *thirty feet in diameter* are killed to the ground; variegated hollies, forty feet high, and other varieties about eighty years old, are all either entirely killed or cut back to the main stem: cedars of Lebanon, about forty feet high are dead, and many fine specimens of yews have their tops killed, and some of them are dead half-way down the stem, which is an unusual occurrence.

Roses, chiefly the more highly-cultivated, and hybridised varieties on dwarf and standard stocks, seem almost extirpated. Those on walls, as before stated, have perished universally.

The loss of so many of our favourites should surely teach us the prudence and expediency of turning the survivors as soon as possible "*upon their own roots;*" for, of course, in most cases where they had not been grafted, although they have suffered in the stem and branches, they will spring again from the root, that part of the plant, even in a season like last winter, being in many cases safe. In recommendation of grafted or budded roses, gardeners assert that they produce finer blooms; but it is surely worth the trouble of cultivators of so universally and justly esteemed a favourite, considering the additional safety which would thereby be secured, to direct their attention to the improvement of the blooms produced by plants on their own roots, so as not to expose their choicest gems to the risk of being totally destroyed in severe seasons.

Before concluding, we may briefly allude to a very general error into which many have fallen in regard to their shrubs and trees injured by the frost, namely, *premature removal or cutting down.* There is no doubt that the cellular tissue was in

many cases so ruptured and destroyed, and the circulation of the juices of the plant thereby so deranged, that a speedy exhibition of vitality was quite impossible; and in several instances it was even June and beginning of July before the withered and skeleton-like hollies, and other evergreens, evinced any sign of latent life, while in April and May the unwilling task of clearing away and cutting over the *quasi* dead shrubs had been in many places far proceeded with; and we think that had a little longer respite been granted, some of the specimens would have been found to have had sufficient life in them to carry on their existence, and in the course of a few years several specimens might thus have been saved, to show again in full luxuriance those rich masses of foliage of which the frost had deprived them.

LIST of STATIONS from which Returns of the Effects of the FROST of DECEMBER and JANUARY last have been obtained, and are hereto appended.

No. in Appendix.	Station.	County.	Altitude in feet.	Deg. of Cold.	Depth of Snow.
1	Riccarton,	Mid-Lothian,	300	+ 6°	30 in.
2	Belstane,	do.	700 to 900.	+ 3	24
3	Oxenford Castle,	do.	450	—10	19½
4	Ingliston,	do.	139	— 5	18
5	Ludgate Lodge,	do.	272	— 4	18
6	Craigpark,	do.	400	+ 1	18
7	Hanley,	do.	150	— 6	15
8	Gogar Burn,	do.	140	— 8	18
9	West Coates,	do.	250	— 1	16
10	Cramond,	do.	a few feet.	— 3	24
11	Clermiston,	do.	300	+ 4	17
12	Hopetoun,	Linlithgowshire,	50 to 80	+ 6	24
13	Kinneil,	do.	80	+ 1	12
14	Carlowrie,	do.	92	— 9	18
15	Linlithgow Palace,	do.	180	—11	24
16	Dalmeny Park,	do.	80	0	16
17	Dundas,	do.	150	—10	12
18	Foxhall,	do.	100	—10	18
19	Polkemmet,	do.	600	— 2	18
20	Craigiehall,	do.	150	—10	14
21	Prestongrange,	Haddington,	100	— 2	12
22	Prestonpans,	do.	50	— 2	12
23	Bughtrig,	Berwickshire,	220	— 3	18
24	Aytoun Castle,	do.	250	0	18
25	Wauchope,	Roxburghshire,	600	+ 9	14
26	Dumcrieff,	Dumfries,	300	— 7	14
27	Drumlanrig,	do.	...	— 2	little.
28	Wanlockhead,	do.	1334	+ 6	little.
29	Cargen,	Kirkcudbright,	80	— 4	a few in.
30	Castle Kennedy,	Wigtonshire,	100	+16	very little.
31	Ginoch,	do.	40 to 50	0	very little.
32	Milrig,	Ayrshire,	448	— 3	2 in.
33	Blythswood,	Renfrewshire,	6	— 9	little.
34	Barochan,	do.	150	—12	little.
35	Elderslie,	do.	a few feet.	— 6	6 in.
36	Craigends,	do.	...	+ 4	little.

No. in Appendix.	Station.	County.	Altitude in feet.	Deg. of Cold.	Depth of Snow.
37	Greenock Cemetery,	Renfrewshire,	83 to 307	+11°	6 in.
38	Orchard,	Lanarkshire,	220	0	little.
39	Brownlee,	do.	250	0	12 in.
40	Milton-Lockhart,	do.	200	— 8	14
41	Braidwood & Carluke,	do.	500 to 560	0	12
42	Hamilton Palace,	do.	...	...	18
43	Darnhall,	Peeblesshire,	800	— 7	7
44	Stobo Castle,	do.	600	—10	14
45	Conypark Nursery,	Stirlingshire,	50 to 70	— 5	4
46	Camis Eskan,	Dumbartonshire,	a few feet.	+10	little.
47	Cambus,	Clackmannan,	50	+ 6	4 in.
48	Orwell Parish,	Kinross,	300 to 400	— 3	12
49	Cambo,	Fife,	50	0	12
50	Kinnedar,	do.	515	0	12
51	Bandrum,	do.	300	0	14
52	Fordell,	do.	256	0	20
53	Inzievar,	do.	200	+ 3	8
54	Collinswell,	do.	50	0	9
55	Ruthven,	Forfarshire,	150	+ 2	24
56	Broughty Ferry,	do.	150	...	...
57	Camperdown,	do.	300	+ 4	6 in.
58	Dundee,	do.	...	+ 4	12
59	Blairdrummond,	Perthshire,	100	— 2	9
60	Lanrick Castle,	do.	300	+ 3	10
61	Taymouth,	do.	370	+ 6	little.
62	Ochtertyre,	do.	366	+12	5 in.
63	Pitfour,	do.	75	+ 3	12
64	Culross Abbey,	do.	70	+ 2	6
65	Dinimarle,	do.	80	+ 2	6
66	Valleyfield,	do.	70	+ 2	6
67	Keir,	do.	400	— 2	3
68	Tulliallan Castle,	do.	50	+ 2	14
69	Dunkeld House,	do.	180	+ 4	12
70	Kilmory,	Argyleshire,	200	+11	none.
71	Ardchattan Priory,	do.	10	+ 9	1 in.
72	Islay House,	do.	40	+ 7	none.
73	Durris,	Kincardineshire,	300	+ 5	14 in.
74	Gordon Castle,	Banffshire,	70	+10	14
75	Aberlour,	do.	300	—11	15
76	Ballindalloch,	do.	400	—11	18
77	Elgin Nurseries,	Morayshire,	35	+ 16	20
78	Muirtown Nursery,	Inverness-shire,	40	...	9
79	Dunrobin,	Sutherlandshire,	6	+16	14
80	Newton & the Garioch,	Aberdeenshire,	350	— 8	36
81	Scabboch Castle,	do.	200	0	18
82	Mar Lodge,	do.	1200	—11	24
83	Balmoral Gardens,	do.	870	— 6	36
84	Invercauld,	do.	1110	—11	24
85	Forss,	Caithness-shire,	50 to 60	+10	18
86	Rosehaugh,	Ross-shire,	500	+ 6	12
87	Stornoway Castle, Lewis,	do.	120	17	14
88	Montford,	Bute,	50	+22	12
89	Orkney Islands, Buttguoy,	Orkney,	70	+18	14
90	Birstane,	do.	150	+18	14
91	Hall of Tankerness,	do.	40	+18	14
92	Sandwick,	do.	94	+15.5	12

Total, 100 Schedules, from 92 different stations.

APPENDIX OF RETURNS TO REPORT.

No. 1.—Riccarton, *Mid-Lothian;* above Sea-Level, 300 feet; Lowest Indication of Thermometer, 6°; Depth of Snow, about 2½ feet.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Abies Morinda	14	15	Loamy	Sand, clay, & boulders	Various	Slightly browned in low places
Araucaria Imbricata	15	18	do.	do.	do.	Some killed; young shoots all browned
Arborea (various)	5 to 6	20	do.	do.	do.	Killed to snow-line
Do. (from India)	Various	Various	do.	do.	do.	Do. do.
Aucuba Japonica	6	12	do.	do.	N.	Do. do.
Abies Douglasi	25 to 30	30	do.	do.	Various	Uninjured in any situation
Arthrotaxus Japonica	2	..	do.	do.	do.	Do. do.
Abies Pattonii	2	..	do.	do.	do.	Do. do.
Do. Mertensiana	10	..	do.	do.	do.	Do. do.
Do. Menziesii	14	16	do.	do.	do.	Do. do.
Andromeda Floribunda	3	10	Peat	do.	E.	Uninjured
Arbutus Procera	8	16	do.	do.	S.	Very little injured
Ailanthus glandulosa	5	7	do.	do.	do.	Uninjured
Azaleas (Ghent)	5	12	do.	do.	Various	Do.
Arthrotaxus Japonica	3	7	Loam	do.	N.	Quite hardy
Berberis Darwinii	5	6	do.	do.	S.	Killed to snow-line
Do. Japonica	3	5	do.	do	N.	Uninjured where slightly protected
Do. Bealii	3	5	do.	do.	do.	Do. do. do.
Broom (Spanish)	7	7	do.	do.	Various	Some dead, and all injured
Buxus Balearica	6	20	do.	do.	S.	Killed to snow
Cryptomeria Japonica	7	10	do.	do.	Various	Not more browned than usual
Cupressus Funebris	3	6	do.	do.	do.	One killed, others much injured. *Not* hardy
Do. Torulosa	5 to 8	8	do.	do.	do.	All injured, some dead to snow-line
Do. Macrocarpa	12	10	do.	do.	do.	All large plants dead
Do. M'Nabiana	6	7	do.	do.	do.	Killed everywhere
Do. Sempervirens	6	6	do.	do.	do.	Do. do.
Do. Majestica	7	8	do.	do.	do.	Do. to snow-line
Do. Gigantea	4	7	do.	do	do.	Much injured
Cephalotaxus Fortunii	3½	7	Peaty	Sand	do.	Long-leaved variety much hurt; short leaved *not* so
Cedrus Deodara	5 to 15	7 to 18	Loamy	Sand, clay, & boulders	do.	Much browned in low places; 50 feet higher all green
Cupressus Lawsonii	4	6	do.	do.	do.	Quite hardy
Cedrus Atlantica	3 to 7	5 to 10	do.	do.	do.	Partially lost foliage; quite hardy
Cupressus Richelii	5	7	do.	do.	S.	Killed to the snow-line
Cedar (white, variegated)	5	12	do.	do.	do.	Not injured
Do. (red, variegated)	2	5	do.	do.	do.	Do.
Catalpa Syringaefolia	5	7	do.	do.	do.	Uninjured
Escallonia Macrantha	5	7	do.	do.	W. wall	Killed to the snow-line
Garrya Elliptica	10	15	do.	do.	Various	Injured, but beginning to shoot
Forsythia Viridissima	8	10	do.	do.	S. wall	Much injured

No. 1.—RICCARTON, *Mid-Lothian*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet	years.				
Juniperus Excelsa	[illegible]	8	Loamy	Clay, sand, & boulders	Various	Quite hardy
Do. Chinensis	6	10	do.	do.	do.	Do. do.
Laurel (Portugal)	20	30	do.	do.	do.	Much browned; none quite dead; bark ruptured
Do. (Bay)	20	30	do.	do.	do.	Much injured in low places (damp)
Lauristinus	6	12	do.	do.	N.	Killed to the snow
Laurus Nobilis	14	10	do.	do.	E. wall	Do. do.
Ligustrum Oralifolium	5	6	do.	do.	W.	Do. do.
Leycesteria Formosa	6	10	do.	do.	N.	Killed to the ground
Paulownia Imperialis	10	12	do.	do.	S.	Uninjured
Paeonia (tree)	5	20	do.	do.	Various	Do.
Picea Bracteata	2½	5	do.	do.	N.	Slightly protected; stood well
Do. Pichta	4	6	do.	do.	do.	Unhurt
Pinus Montezumæ	5	10	do.	do.	E.	A good deal injured
Do. Insignis	8	15	do.	do.	N.	All but killed
Do. Sinensis	8	15	do.	do.	do.	Do.
Do. Muricata	4 to 8	7	do.	do.	do.	All much injured, one only slightly
Picea Webbiana	5 to 6	10	do.	do.	Various	Partially lost foliage, but buds swelling
Do. Nobilis	5 to 20	20	do.	do.	do.	Quite uninjured in all situations
Do. Nordmanniana	3 to 5	Various	do.	do.	do.	Do. do
Do. Pindrow	3	do.	do.	do.	do.	Do. do.
Do. Grandis	6	do.	do.	do.	do.	Do. do.
Do. Cephalonica	7	do.	do.	do.	do.	Do. do.
Do. Pinsapo	6	do.	do.	do.	do.	Do. do.
Pinus Jeffreyii	4 to 5	do.	do.	do.	do.	Do. do. These Coniferæ are frequently more injured by slight spring frosts
Do. Ponderosa	10 to 12	do.	do.	do.	do.	Do. do.
Do. Tuberculata	3	do.	do.	do.	do.	Do. do.
Do. Craigiana	2	do.	do.	do.	do.	Do. do.
Do. Lambertiana	8	do.	do.	do.	do.	Do. do.
Do. Monticola	5	do.	do.	do.	do.	Do. do.
Do. Excelsa	14	do.	do.	do.	do.	Do. do.
Picea Lasiocarpa	3	do.	do.	do.	do.	Do. do.
Pinus Benthamiana	7	do.	do.	do.	do.	Do. do.
Quercus Ilex	15	17	do.	do.	S.	Mostly lost foliage; budding
Rhododendron Arborea	5 to 6	20	Peaty	Sand	Various	Killed to snow-line
Rhamnus Alaternis (variegated)	15	30	Loam	Sand, clay, & boulders	S. wall	Killed
Roses	Various	Various	do.	do.	Various	Killed to snow; Gallica and Bourbon safe
Rhododendron Ponticum	10	20	Peat	do.	do.	Slightly injured in low places
Taxus Elegantissima	4	7	Strong loam	do.	S.	Unhurt
Do. Adpressa	4	7	do.	do.	do.	Do.
Do. Baccata aurea	5	10	do.	do.	do.	Do.
Thuja Gigantea	4 to 5	Various	Loamy	do.	do.	Quite uninjured
Do. Craigiana	4	do.	do.	do.	do.	Do.
Thujopsis Borealis	5	do.	do.	do.	do.	Do.
Taxodium Sempervirens	15	11	do.	do.	do.	Uninjured in plantations, brown if exposed

No. 1.—Riccarton, *Mid-Lothian*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Wellingtonia Gigantea	5 to 9	Various	Loamy	Clay, sand, & boulders	Various	Quite uninjured
Whins	Various	do.	do.	do.	do.	Killed to snow-line
Golden Hollies	20	30	do.	do.	do.	Foliage slightly injured
Apricot	Various	Various	do.	do.	S. wall.	Not hurt, and fruit well set
Peach trees	do.	do.	do.	do.	do.	A good deal injured

Trees and shrubs (generally speaking), excepting in the low and damp parts of the grounds, have suffered little; and, singular enough, Portugal Laurels, transplanted in last spring, suffered severely, while others transplanted at midsummer are much less injured.

No. 2.—Belstane, *Mid-Lothian*; above Sea-Level, 700 to 900 ft.; Lowest Indication of Thermometer, 3°; Depth of Snow, about 2 ft.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Abies Douglasii	30	15	Heavy	Sandy clay	Various	Quite uninjured
Do. Menziesii	24	14	do.	do.	do.	Do.
Do. Smithiana	7	8	do.	do.	do.	Do.
Do. Hookeriana	Small	3	do.	do.	do.	Do.
Araucaria Imbricata	5	8	do.	do.	do.	Some browned; others untouched
Ailanthus	Various	Various	do.	do.	do.	Untouched
Buxus Balearica	do.	do.	do.	do.	do.	Do.
Berberis Dulcis	do.	do.	do.	do.	do.	Do.
Do. Purpurea	do.	do.	do.	do.	do.	Do.
Do. Impetrifolia	do.	do.	do.	do.	do.	Do.
Do. Darwinii	do.	do.	do.	do.	do.	Injured
Cedrus Deodara	9	10	do.	do.	do.	Uninjured
Do. Atlantica	9½	10	do.	do.	do.	Do.
Do. Libani	12	13	do.	do.	do.	Do.
Cupressus Lawsonii	2½	4	do.	do.	do.	Untouched
Do. M'Nabiana	5	7	do.	do.	do.	Slightly touched
Do. Lambertiana	16	10	do.	do.	do.	Some browned; others untouched
Cryptomeria Japonica	Various	Various	do.	do.	do.	Uninjured
Chimoanthus Fragrans	do.	do.	do.	do.	do.	Do.
Clematis Azurea	do.	do.	do.	do.	do.	Do.
Do. Bicolor	do.	do.	do.	do.	do.	Do.
Do. Grandiflora	do.	do.	do.	do.	do.	Do.
Do. Hendersonii	do.	do.	do.	do.	do.	Do.
Do. Flamula	do.	do.	do.	do.	do.	Do.
Do. Montana	do.	do.	do.	do.	do.	Do.
Cratægus Cordata	do.	do.	do.	do.	do.	Do.
Cedar (white and red)	do.	do.	do.	do.	do.	Do.
Cotoneaster Affinis	do.	do.	do.	do.	do.	Do.
Do. Macrophylla	do.	do.	do.	do.	do.	Do.
Desphontanea Spinosa	do.	do.	do.	do.	On wall	Lips of last year's wood injured
Escalonia Macrantha	do.	do.	do.	do.	Open	Slightly injured
Do. Pterocladon	do.	do.	do.	do.	do.	Do.
Fortune's Yellow China Rose	do.	do.	do.	do.	On wall	Suffered severely
Garrya Elliptica	do.	do.	do.	do.	Open	Slightly injured

No. 2.—Belstane, *Mid-Lothian*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Hollies (var.)	Various	Various	Heavy	Sandy clay	Open	Uninjured
Laurels (Portugals)	do.	do.	do.	do.	do.	Do.
Do. (Common Bay)	do.	do.	do.	do.	do.	Do.
Leycesteria Formosa	do.	do.	do.	do.	do.	Slightly injured
Picea Pinsapo	10	12	do.	do.	do.	Uninjured
Do. Cephalonica	14	12	do.	do.	do.	Do.
Do. Nordmanniana	4½	5	do.	do.	do.	Do.
Do. Nobilis	6	10	do.	do.	do.	Do.
Do. Pichta	10½	12	do.	do.	do.	Do.
Do. Webbiana	10	12	do.	do.	do.	3 plants lost foliage of young wood; others safe
Do. Pindrow	9	12	do.	do.	do.	Uninjured
Pinus Insignis	9	10	do.	do.	do.	Sadly cut up
Do. Benthamiana	4	5	do.	do.	do.	Uninjured
Do. Jeffreyii	3	5	do.	do.	do.	Do.
Do. Tuberculata	1	2	do.	do.	do.	Do.
Do. Lambertiana	10	12	do.	do.	do.	Do.
Do. Excelsa	16	12	do.	do.	do.	Do.
Do. Hamiltonii	12	13	do.	do.	do.	Do.
Do. Pyrenaica	8	11	do.	do.	do.	Do.
Do. Pattonii	9 in.	2	do.	do.	do.	Do.
Do. Sequoia	14	9	do.	do.	do.	Foliage slightly browned only
Rhododendron Ponticum	Various	Various	do.	do.	do.	Uninjured
Do. Hybrids	do.	do.	do.	do.	do.	Do.
Roses, Hyb., Perpet., &c.	do.	do.	do.	do.	do.	Do.
Salisburia Adantifolia	do.	do.	do.	do.	do.	Do.
Spirea Bella	do.	do.	do.	do.	do.	Do.
Do. Lindleyana	do.	do.	do.	do.	do.	Do.
Sambucus (Elder)	do.	do.	do.	do.	do.	Do.
Thuja Craigiana	do.	do.	do.	do.	do.	Do.
Do. Gigantea	do.	do.	do.	do.	do.	Do.
Do. Aurea	do.	do.	ds.	do.	do.	Do.
Do. Pendula	do.	do.	do.	do.	do.	Do.
Thujopsis Borealis	do.	do.	do.	do.	do.	Do.
Taxus Adpressa	do.	do.	do.	do.	do.	Do.
Vaccinium Ovatum	do.	do.	do.	do.	do.	Do.
Yews (var.)	do.	do.	do.	do.	do.	Do.
Wellingtonia Gigantea	do.	do.	do.	do.	do.	Do.

No. 3.—Oxenford Castle, *Mid-Lothian*; above Sea-Level, 450 ft.; Lowest Indication of Ther., —10°; Depth of Snow, 19½ inches.

Araucaria Imbricata	6 to 12	12 to 18	Clay	Clay	S.	Points of side-branches killed
Abies Morinda	8	..	Gravelly	Gravel	N.	Much injured
Cedrus Deodara	10	15	Clay	Clay	E.	Lost foliage only
Cotoneaster	10	..	Do.	Do.	N.	Quite killed

No. 3.—OXENFORD CASTLE, *Mid-Lothian*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Cotoneaster	10	..	Clay	Clay	S. wall	Quite safe (wood better ripened on S. wall)
Hollies (Common)	6 to 20	30	Light	Gravel	Various	Much injured, especially by sides of roads and walks exposed to S. wind
Do. (Golden)	6 to 10	30	do.	do.	do.	
Laurel (Portugal)	10	Various	Light loam	do.	do.	Foliage and young wood killed; worse if shaded
Do. (Bay)	Various	do.	do.	do.	do.	All killed above snow-line
Lauristinus	do.	do.	do.	do.	do.	Killed above snow
Quercus Ilex	12	..	do.	do.	do.	Injured; shedding leaves now
Rosemary	10	10	Gravelly	do.	S. wall	Dead
Roses (Standard)	4½	Various	..	..	Various	Quite destroyed in every situation
Taxodium Sempervirens	12	10	Clay	Clay	N.	Quite safe; sheltered from S. and W.
Cupressus Lawsonii	Various	Various	..	..	Various	Quite hardy
Peaches and Apricots	..	..	..	..	..	All injured on S. walls

No. 4.—INGLISTON, *Mid-Lothian*; above Sea-Level, 139 feet, and 75 feet below the level of Canal; Lowest Indication of Thermometer, —5°; Depth of Snow, 18 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	6	12	Loam	Clay	W.	All killed
Cedrus Deodara	5	10	do.	do.	do.	Killed to snow-line
Escalonia Macrantha	7	9	Peat & loam	Gravel	S.	Killed to the ground
Hollies (var.)	8 & var.	12	Loam	Sand	N.	Do. do.
Junipers (var.)	Various	Various	do.	do.	do.	Uninjured
Laurel (Bay)	12	do.	Clay	Gravel	N.	Killed to the ground
Do. (Portugal)	16	do.	do.	do.	do.	Do. do.
Do. (Sweet Bay)	3	8	Loam	Clay	E.	Do. do.
Lauristinus	4	7	Sandy loam	Gravel	W.	Do. do.
Rhododendron	Various	Various	do.	do.	do.	Uninjured (a little browned)
Roses (var.)	2 to 3	3	Peat, loam, & sand	Clay	do.	Killed
Taxus Baccata	Various	Various	Loam	Do.	do.	Uninjured

No. 5.—LUDGATE LODGE (RATHO), *Mid-Lothian*; above Sea-Level, 272 feet, and 40 feet above Canal; Lowest Indication of Thermometer, —4°; Depth of Snow, 18 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Arborvitæ (var.)	14 to 18	20	Good rich soil	Sand upon whinstone	E. & S.	Uninjured
Araucaria Imbricata	6 to 7	9	do.	do.	do.	Side-shoots browned at tips; top unhurt
Aucuba Japonica	4	8	do.	do.	do.	Killed to snow-line
Azaleas (var.)	3	Old	do.	do.	do.	Uninjured
Buxus Arborescens	3	do.	do.	do.	do.	Do.
Cedrus Deodara	11	10	do.	do.	do.	Very slightly injured; now recovering
Ilex (Hollies)	Various	Various	do.	do.	do.	Variegated, slightly hurt; Common, hardy
Juniperus (various)	2 to 10	..	do.	do.	do.	Uninjured
Lauristinus	4	8 to 10	do.	do.	do.	Killed to snow; trunks of several *split*
Laurel (Portugal)	3 to 16	Old	do.	do.	do.	Slightly injured
Do. (Common)	3 to 12	do.	do.	do.	do.	Do.
Do. (Sweet Bay)	Various	Various	do.	do.	do.	Killed to snow-line

No. 5.—LUDGATE LODGE (RATHO), *Mid-Lothian*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Pinus Excelsa	8	10	Good rich soil	Sand upon whinstone	E. & S.	Very slightly injured; now healthy
Quercus Ilex	7	10	do.	do.	do.	Very much injured to snow-line
Rhododendrons (var.)	Various	Various	do.	do.	do.	Uninjured
Pæonia Moutan-Papaveracea	do.	do.	do.	do.	do.	Do.
Roses (var.)	do.	do.	do.	do.	do.	Lost 4 standards only; dwarfs under snow safe; China, killed to ground
Taxus Baccata	½ to 12	15	do.	do.	do.	Uninjured
Do. Fastigiata	10 to 16	15	do.	do.	do.	Do.
"Neidpath" Yew	8	12	do.	do.	do.	Do.

No. 6.—CRAIG PARK, *Mid-Lothian;* above Sea-Level, 400 feet, and above Union Canal, 172 feet; Lowest Indication of Thermometer, 1°; Depth of Snow, about 1½ feet.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	8 to 10	12	Light	Dry and rocky	N. & E.	Slightly injured in the points
Arbor Vitæ	6	10	Free loamy	Rocky	W.	Uninjured
Arbutus Unedo	10	12	do.	do.	S. wall	Completely "burnt" to stem
Cedrus Deodara	5	14	do.	do.	W. N. & S.	Foliage slightly browned
Cupressus	8	10	do.	do.	W.	Uninjured
Cotoneaster	15	14	do.	do.	S. wall	Young soft shoots browned
Lauristinus	5	..	do.	do.	N. & W.	Killed to the ground
Laurel (Bay)	4 to 10	10	do.	do.	do.	Slightly injured
Sweet Bay	8	12	do.	do.	N.	Killed to the ground

Those plants in the low situations, and where the soil is richer, appear to have been most effected.

No. 7.—HANLEY, *Mid-Lothian;* above Sea-Level, 150 feet, and 82 feet *below* the Canal; Lowest Indication of Thermometer,—6°, it might have been lower, the Index being stopped at the end of the Tube; Depth of Snow, 15 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	6 to 12	8 to 12	Fine mould	Light gravelly	Open at S.	Killed.
Budlea Globosa	12	10	do.	do.	On wall E.	Do.
Cotoneaster	6	12	do.	do.	do.	Do.
Cedrus Deodara	5 to 15	4 to 12	do.	do.	Open	Do. to snow-line
Cupressus Lambertiana	6	6	do.	do.	do.	Do.
Hollies (Common)	5 to 20	8 to 50	do.	do.	do.	Completely gone—upwards of 100 lost
Laurels (Portugal)	5 to 15	10 to 20	do.	do.	do.	Completely dead—lost above 200 of these evergreens
Do. (Common	6	5	do.	do.	do.	Do. do. do.
Arbor Vitæ	Various	Various	..	..	..	Have sustained little injury
Junipers	do.	do.	..	..	..	Do. do.
Peach Trees	..	..	..	..	On wall.	Have been somewhat injured
Forest Trees	Various	Various	..	..	..	Have not suffered apparently

No. 8.—Gogar Burn, *Mid-Lothian;* above Sea-Level, 140 feet; Lowest Indication of Thermometer, —8°; Depth of Snow, 18 inches.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Araucaria Imbricata	12	14	Strong loam	Clay	S., open	Killed to ground. No signs of life yet
Cedrus Deodara	6 to 8	10	do.	do.	S.	Injured to snow-line. Recovering
Chinese Ash	20	35	do.	do.	S.	Last year's wood killed
Garrya Elliptica	6	9	do.	do.	E.	Killed to ground. Cut over
Ilex Aquifolium	12 to 14	15 to 20	do.	do.	Open	Do. do. Cut down
Laurels (Portugal)	8 to 12	20	do.	do.	do.	Do. do. do.
Do. (Bays)	4 to 6	10	do.	do.	do.	Killed to snow-line
Misletoe	7	20	do.	do.	On stand.	Quite dead
Peach Trees	12	20	do.	do.	S. wall	Lost last year's wood
Rhododendrons	Various	Various	do.	do.	Various	Quite hardy
Taxus Baccata	14	25	do.	do.	E.	Killed in *one* instance, the others very much injured
No. 9.—West Coates Nursery, *Mid-Lothian;* above Sea-Level, 250 feet; Lowest Indication of Ther., —1°; Depth of Snow, 16 in.						
Araucaria Imbricata	4 to 8	6 to 15	Free loam	Clay sand	S.	Killed to snow-line
Abies Douglasi	6	10	do.	do.	do.	Perfectly hardy
Ayrshire Roses	6	12	do.	do.	Open, wall	Killed to ground
Biota Meldensis	2½	5	do.	do.	do.	Killed to snow-line
Balsam Poplars	14	16	do.	do.	do.	Lost tops and one year's growth
Cedrus Deodara	5	11	do.	do.	S.W.	Much injured; lost foliage and points of branches
Cupressus Lawsonii	2⅓	5	do.	do.	do.	Perfectly hardy
Do. Lambertiana	3⅓	7	do.	do.	do.	Slightly injured
Cedrus Atlantica	6	9	do.	do.	do.	Slightly singed
Cryptomeria Japonica	4	5	do.	do.	do.	Do. do.
Lauristinus	1½	4	do.	do.	do.	Saved where covered by snow
Laurel (Bay)	2½	4	do.	do.	do.	Safe under snow. In points above snow-line much injured
Do. (Portugal)	2	5				
Privet Hedge	4	14	do.	do.	do.	Suffered considerably; tops dead
Pinus Nordmanniana	2	6	do.	do.	do.	Quite hardy
Do. Menziesii	4	7	do.	do.	do.	Do.
Roses (Standards)	Various	Various	do.	do.	do.	Seventy-five per cent destroyed
Thuja Gigantea	2½	5	do.	do.	do.	Perfectly hardy
Peaches, Nectarines, and Apricot Trees	Young plants	..	do.	do.	Wall	Cut down to snow-line
Wellingtonia Gigantea	3	6	do.	do.	Open	Perfectly hardy
No. 10.—Cramond, *Mid-Lothian;* above Sea-Level a very few feet; Lowest Indication of Ther., —3°; Depth of Snow, about 2 feet.						
Arbutus, various	Various	Various	Loam	Sand	Various	Suffered considerably. Cut over to the ground
Aucuba Japonica	do.	do.	do.	do.	do.	Do do. do. do.
Alaternus Rhamnus	do.	do.	do.	do.	do.	Suffered much, but not so severely as the two preceding
Araucaria Imbricata	do.	do.	do.	do.	do.	Very much cut up
Cryptomeria Japonica	do.	do.	do.	do.	do.	Do. do.
Lauristinus	do.	do.	do.	do.	do.	Killed to snow-level

No. 10.—CRAMOND, *Mid-Lothian*—Continued.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Laurel (Portugal)	Various	Various	Loam	Sand	Various	Much hardier than Lauristinus. Middle-sized and smaller plants suffered far more than the large specimens. Very little blossom (and that only very withered-looking), this season
Do. (Bay)	do.	do.	do.	do.	do.	Large plants suffered less than the middle-sized, which have been generally killed to snow-line. Small plants under snow safe
Sweet Bays	do.	do.	do.	do.	do.	The oldest and largest have suffered most; one large plant, upwards of 40 years old, quite killed

What is very strange, and seldom seen, is that many Half-Hardy plants in this district have survived the winter, and Calceolarias, Verbenas, Pelargoniums, and Fuchsias have all stood better than most people ever remember. Vegetables have all wintered well; even Cauliflower, planted in August 1860, stood quite well, which is a rare occurrence.

No. 11.—CLERMISTON, *Mid-Lothian;* above Sea-Level, 300 feet; Lowest Indication of Thermometer, 4°; Depth of Snow, 17 inches.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Aucuba Japonica	Various	Various	Heavy loam	Blue clay	W.	Quite healthy; uninjured.
Cedrus Deodara	2	4	do.	Sand and blaze	do.	Do. do.
Do. Libani	2	4	do.	do.	do.	Do. do.
Buxus Arborescens	5 to 9	15	do.	do.	do.	Do. do.
Red Cedars	4	7	do.	do.	do.	Do. do.
Ligustrum Lucidum	Various	Various	do.	do.	do.	Do. do.
Taxus Baccata	8 to 16	do.	do.	do.	do.	Do. do.
Wellingtonia Gigantea	2	4	do.	do.	do.	Do. do.
Quercus Ilex	Various	Various	do.	do.	do.	Do. do.
Laurel (Bay)	6 to 12	do.	do.	do.	do.	Do. do.
Portugal Laurel	do.	do.	do.	do.	do.	Do. do.
Roses (budded) Standard	..	..	do.	do.	do.	Killed to ground completely

All Shrubs have stood here well. The Evergreens have, however, cast their foliage this summer, as they sometimes do after a very severe drought or frost.

No. 12.—HOPETOUN, *Linlithgowshire;* above Sea-Level, 50 to 80 feet; Lowest Indication of Ther., 6°; Depth of Snow, about 2 feet.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Abies Grandis	1½	5	Loamy	Gravel	N.	Uninjured
Do. Morinda	55	42	do.	do.	do.	Do.
Do. Douglasi	60	30	do.	do.	do.	Do.
Do. Nordmanniana	3	6	do.	do.	do.	Do.
Araucaria Imbricata	12	18	do.	do.	S.	Much browned; most of last year's wood *killed*
Arthrotaxus Cupressoides	1	3	Light loam	Peat	do.	Much injured
Arbutus Unedo	14	25	Peaty	do.	N.	Dead
Biota Meldensis	1	3	Light loam	do.	S.	Much injured
Cedrus Deodara	25	25	Loamy	Gravel	N.	Slightly browned
Cupressus Torulosa	8	14	do.	do.	S.	Dead
Do. Lambertiana	8	9	do.	do.	N.	Uninjured

No. 12.—Hopetoun, *Linlithgowshire*—Continued.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Cupressus Goveniana	2	4	Loamy	Gravel	N.	Injured
Do. Funebris	2	4	do.	do.	do.	Dead
Do. M'Nabiana	5	7	do.	do.	do.	Much injured; some dead
Do. Lawsonii	1½	4	Light loam	Peat	do.	Uninjured
Do. Macrocarpa	3	4	do.	do.	do.	Dead
Chamaecyparis Sphaeroidea	2½	4	do.	do.	do.	Uninjured
Cryptomeria Japonica	3	6	do.	Gravel	do.	Slightly injured
Cephalotaxus Fortunii	2	5	do.	do.	do.	Uninjured
Fitzroya Patagonica	3	6	do.	do.	do.	Slightly injured
Juniperus Mexicana	2	5	do.	Peat	do.	Dead
Do. Thurifera	2	5	do.	do.	do.	Injured
Do. Gossamthanea	2	5	do.	do.	do.	Do.
Libocedrus Chilensis	2	5	do.	Gravel	do.	Do.
Quercus Ilex	50	50	Loamy	do.	S.	Very much injured
Pinus Montezumæ	1	4	Light loam	do.	N.	Injured
Do. Hartwegii	1	4	do.	do.	do.	Do.
Do. Ponderosa	4	7	do.	do.	do.	Uninjured
Do. Jeffreyii	3	6	Loamy	do.	S.	Do.
Picea Nobilis	3	6	do.	do.	do.	Do.
Do. Cephalonica	8	16	do.	do.	N.	Do.
Rhamnus Alaternus	Various	Various	do.	do.	Various	Dead to the ground
Lauristinus	do.	do.	do.	do.	do.	Do. do.
Laurels (Bays)	do.	do.	do.	do.	do.	Dead to the snow-line
Do. (Sweet Bays	do.	do.	do.	do.	do.	Do. do.
Thuja Aurea	2	4	do.	Peat	N.	Much injured
Wellingtonia Gigantea	4	5	do.	do.	do.	Injured (but in a damp situation)
Old Yellow Tea Rose	20	30	do.	Gravel	W. wall	Dead on a wall budded on Banksiana
China Roses	Various	Various	..	..	Various	All dead
Hybrid, China, & Perpetual Roses	..	..	..	..	..	Budded on briars. Very many dead in all situations

No. 13.—Kinneil, *Linlithgowshire;* above Sea-Level, 80 feet; Lowest Indication of Thermometer, 1°; Depth of Snow, about 12 inches.

Araucaria Imbricata	6	12	Hazelly loam	Clay	N.	Points slightly injured
Budlea Globosa	10	40	Gravelly	Gravel	S.	Killed
Cryptomeria Japonica	5	8	do.	do.	W.	Not injured
Ilex (various golden)	35	70	Stiff loam	Clay	N.	Do.
Lauristinus	3	8	Gravelly	Gravel	S.	Killed
Rhododendron Arboreum	6	16	Peat	Clay	W.	Not injured
Roses (Standard)	Various	Various	Stiff loam	do.	Open	Cut back a little; now growing vigorously
Taxodium Sempervirens	9	10	Gravelly	Gravel	W.	Not injured

No. 14.—Carlowrie, *Linlithgowshire;* above Sea-Level, 92 feet; Lowest indication of Thermometer, —9° on 24th December 1860, —7° on 27th December 1860; Depth of Snow, 18 inches.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Araucaria Imbricata	3 to 4	6 to 8	Clayey loam	Gravel and clay.	S.	Killed to snow-level
Aucuba Japonica	Various	Various	do.	do.	Various	Killed to the ground in many cases, and in others only to snow-level.
Andromeda Floribunda	4	10	do.	do.	S.	Quite hardy
Acacia	72	Prob. 100	do.	do.	do.	Do., but less bloom *this* summer
Arbutus Unedo	3	5	do	do.	Open	Killed outright
Adder's Tongue	1	12	do.	do.	do.	Leaves slightly scorched
Arbor Vitæ (various)	10	20	do.	do.	S.	Slightly browned, but safe
Abies Morinda	10	15	do.	do.	N.W.	Very healthy
Aristolochia Sipho	4	6	do.	do.	E. wall	Killed
Buxus Balearica	5	15	do.	do.	N.	Browned slightly on foliage
Do. Sempervirens	4	10	do.	do.	Open	Very slightly on foliage
Berberis Darwinii	5	15	do.	do.	N.W.	Killed to snow-line
Do. Japonica	4	12	do.	do.	do.	Killed to ground; springing
Do. Canadensis	4	12	do.	do.	W.	Quite hardy
Do. Dealbata	5	15	do.	do.	do.	Killed to the ground
Do. Sinensis	6	15	do.	do.	do.	Very little injured
Cedrus Deodara	3 to 5	4 to 6	do.	do.	Open	Much injured above snow; shedding foliage
Cupressus Lawsonii	1	3	do.	do.	W. & E.	Quite hardy and very healthy
Cedar, red and white	Various	Various	do.	do.	Open	Browned on tips of shoots
Cedrus Libani	30	Prob. 100	do.	do.	W.	Points of young wood a little browned
Do. Atlantica	8	12	do.	do.	S.E.	A good deal browned; shedding foliage off young wood
Cotoneaster Buxifolia	4	8	do.	do.	S. wall	Quite hardy
Corchorus Japonica	8	10	do.	do.	do.	Lost two years' wood
Cratægus Coccinea	6	12	do.	do.	Open	Quite healthy
Do. Mexicana	5	8	do.	do.	do.	Quite hardy
Ghent Azaleas	6	15	do.	do.	do.	Do.
Hollies, various	1 to 60	3 to 100	do.	do.	Various	All much injured; some all but dead. Shedding foliage and *re*-budding
Jasminum Officinale	Various	Various	do.	do.	W. wall	Quite dead
Cornus Sanguinea	4	12	do.	do.	W.	Quite healthy
Leycesteria Formosa	4	7	do.	do.	Open	Killed to ground
Laurels (Bay).	3 to 8	Various	do.	do.	Various	Quite killed to snow-line
Do. (Portugal)	3 to 6	do.	do.	do.	do.	Killed to snow-line in many cases
Lauristinus	2 to 4	5	do.	do.	do.	Totally lost where unprotected
Pœonia Moutan Papaveracea	Various	Various	do.	do.	N.	Dead to snow-line
Pyrus Japonica	2	5	do.	do.	S. wall	Safe
Passiflora Cœrulea	8	20	do.	do.	do.	Dead to snow-line
Rhododendron Ponticum	5	10	do.	do.	Open	Injured a good deal
Do. Hybrid	4	12	do.	do.	do.	Killed to snow
Salisburia Adantifolia	3	4	do.	do.	do.	Hardy; *points* a little injured
Standard Roses	Various	Various	do.	do.	Various	Terribly cut up (75 per cent lost)
Syringa Persica	5	12	do.	do.	do.	Safe

No. 14.—Carlowrie, *Linlithgowshire*—Continued.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Syringa Vulgaris	7	15	Clayey loam	Clay and gravel	Various	Safe; in exposed places *tips* injured
Spirea Prunifolia	3	12	do.	do.	N.	Killed to snow-line
Do. Floripendula	12	20	do.	do.	W.	Do. do.
Wellingtonia Gigantea	3	5	do.	do.	S.	Perfectly healthy
Yew Hedge	4	20	do.	do.	..	Much scorched on the outsides where *clipt*
Apricot and Peach Trees on south wall very much cut up, especially the latter. No blossom, and leaves falling off						
Apple Trees on south wall in many places lost last year's wood, and little or no blossom this season						
All *Wall* Roses quite dead. Canadian Privet, imported direct two years ago, quite hardy. Common Privet much scorched, and young shoots dead. Canadian *Bourtree*, imported also two years ago, quite hardy; while the common Bourtree near it has lost a year's wood.						
No. 15.—Linlithgow Palace, *Linlithgowshire*; above Sea-Level, 180 ft.; Lowest Indication of Ther., —11°; Depth of Snow, about 2 ft.						
Araucaria Imbricata	7	12	Peat, loam, and sand	Debris from Palace	N.E.	Killed to the ground
Abies Morinda	4½	7	do.	Sand	S. & E.	Tops injured
Birch	10 to 17	8	Rich loam	Various	do.	Many killed, others producing a few small leaves only
Beech	6 to 8	8	do.	do.	do.	Some killed to the ground
Cedrus Libani	4 to 8	5	Peat and loam	do.	do.	Tops injured
Do. Deodara	4 to 8	5	do.	do.	do.	Some injured at top, others killed to ground
Elm (Wych)	10 to 16	5	do.	do.	do.	Killed
Do. (Fan)	10 to 16	5	do.	do.	do.	Several years' wood dead
Flowering Ash	8	5	do.	do.	do.	All branches killed
Ilex or Holly	4 to 8	5	do.	do.	do.	Very little injured
Laurel (Portugal)	4 to 6	5	do.	do.	Various	Killed to ground and snow-line
Aucuba Japonica	4 to 6	5	do.	do.	do.	Do. do. do.
Oak (common)	8 to 12	5	do.	do.	do.	Tops and points of branches dead
Do. (Turkey)	8 to 12	5	do.	do.	do.	Do. do. do.
Do. (Evergreen)	3 to 5	5	do.	do.	do.	Killed to snow-line
Pinus Excelsa	5	5	do.	do.	do.	Killed half-way down
Rhododendron	Various	5	do.	do.	do.	Some killed, others untouched.
Roses	do.	5	do.	do.	do.	Fifty per cent dead
Service Tree	8	5	do.	do.	do.	All branches killed
Weeping Willow	8	5	do.	do.	do.	All killed
Yew (common)	Various	5	do.	do.	do.	Many severely injured
No. 16.—Dalmeny Park, *Linlithgowshire*; above Sea-Level, 80 ft.; Lowest Indication of Ther., below zero; Depth of Snow, 16 in.						
Arbutus Unedo	20	30	Stiffish loam	Clay	Partly to Sea	Partially killed (cut back)
Do.	5	16	do.	do.	do.	Killed to the ground
Cedrus Deodara	8	10	Light	Sandy	do.	Foliage killed, but recovering
Lauristinus	3 to 4½	10 to 20	Stiff loam	Clay	do.	Killed to the ground (springing)
Laurels (common)	8 to 10	20 to 30	do.	do.	Und. trees	Leaves browned; wood not killed
Do. (Portugal)	6 to 10	20 to 30	do.	do.	do.	Perfectly green; not at all hurt

No. 16.—DALMENY PARK, *Linlithgowshire*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Peach Trees	12	15	Stiff loam	Clay	On wall to Sea	A good deal injured: inclined to throw out gum on branches
Roses on Walls	6 to 8	20	Loamy	do.	do.	Killed almost all to ground
Do. Standards	6 to 8	10	do.	do.	do.	Killed (nearly all)
No. 17.—DUNDAS, *Linlithgowshire*; above Sea-Level, about 150 feet; Lowest Indication of Ther.,—10°; Depth of Snow, about a foot.						
Araucaria Imbricata	9	15	Light loam	Whinstone rock	E.	Quite safe
Azalea (var.)	4	20	do.	do.	S.	*Do.*
Calicanthus Florida	6	20	do.	do.	W. wall	All safe
Lauristinus	4	20	do.	do.	S.	Killed to the ground
Laurel (Portugal)	6	34	do.	do.	E.	Do. do.
Do. (Bay)	15	20	do.	do.	S.	Quite hardy
Do. (Sweet Bay)	20	30	do.	do.	do.	Killed to the ground
Rhododendron (var.)	9	20	do.	do.	do.	Quite safe
Roses (var.)	Various	Various	do.	do.	do.	Killed to ground; springing at roots
Jasminum Officinale	10	20	do.	do.	W. wall	Uninjured
Taxus Baccata Fastigata	12	12	do.	do.	S.	Quite safe
Willow, from St Helena	20	11	do.	do.	do.	Quite hardy
Wistaria Sinensis	18	20	do.	do.	S. wall	Do.
No. 18.—FOXHALL, *Linlithgowshire*; above Sea-Level, 100 feet; Lowest Indication of Thermometer, —10°; Depth of Snow, 18 inches.						
Araucaria Imbricata	3	8	Sandy loam	Sand	S.	Completely dead
Ilex (Hollies)	20	50 to 60	do.	do.	do.	Branches killed; life only in stem
Laurel (common)	10	Various	do.	do.	do.	Killed to about a foot of ground
Do. (Portugal)	20	100	do.	do.	do.	Killed to within two feet of ground
Standard Roses	3	Various	do.	do.	do.	Entirely destroyed
Thuja Gigantea	10	18	do.	do.	do.	Do.
No. 19.—POLKEMMET, *Linlithgow*; above Sea-Level, 600 feet; Lowest Indication of Thermometer, —2°; Depth of Snow, about 18 in.						
Arbor Vitæ (var.)	20 to 25	Various	Loam	Till	S.	Safe
Ilex (Hollies)	3 to 10	do.	do.	do.	do.	Do.
Laurel (Bay)	6 to 12	35	Heavy loam	do.	S. slope	More or less killed by frost; 20 plants almost uninjured on the top of the slope
Do. (Bay)	6 to 12	35	do.	do.	N.E.	Five killed, others safe
Do. (do.) clump	9	20	do.	do.	E. wall	Safe
Do. (Bays)	4 to 6	25	Good soil	do.	Shaded by trees	All killed to ground (springing)
Roses (Standards)	3½	Various	do.	do.	S.	All killed except two plants
Rhododendrons	2 to 4	20	do.	Moss	do.	Mostly safe

No. 20.—CRAIGIEHALL, *Linlithgow*; above Sea-Level, about 100 feet; Lowest Indication of Thermometer, —10°; Depth of Snow, about 14 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Araucaria Imbricata	5	10	Clay loam	Sandy clay	S.	Totally killed
Arbor Vitæ (Chili)	1 to 2.	4	do.	do.	do.	Partly injured
Arbutus Unedo	2	6	do.	do.	do.	Quite destroyed
Biota Glauca	2	5	do.	do.	do.	Killed
Do. Orientalis	12	24	do.	do.	do.	Uninjured
Cedrus Deodara	5	12	do.	do.	do.	Killed to snow-line
Do. Atlantica	3½	7	do.	do.	do.	Killed
Cupressus Lawsonii	3	6	do.	do.	do.	Partly injured
Deodara Viridis	2	4	do.	do.	do.	Killed to snow-line
Ilex (Holly), var.	5	12	do.	do.	do.	Much injured in side-shoots
Holly Hedge	6	20	do.	do.	do.	Sides injured, top (under snow) safe
Laurel (Bay)	6 to 7	24	do.	do.	do.	Killed to snow-line
Do. (Portugal)	8 to 10	30	do.	do.	do.	Killed to snow-level
Lauristinus	2½	5	do.	do.	do.	Two-thirds totally destroyed
Juniperus Pendula	5	7	do.	do.	do.	Killed
Ligustrum	6	20	do.	do.	do.	Killed to snow-line
Pinus Cedrus	30	24	do.	do.	do.	Uninjured
Do. Excelsa	2	6	do.	do.	do.	Do.
Do. Insignis	3	7	do.	do.	do.	Totally destroyed
Do. Robusta	4	6	do.	do.	do.	Killed
Rhododendron (var.)	3	9	do.	do.	do.	Uninjured
Taxus Baccata	10	80	do.	do.	do.	Do.
Do. Fastigiata	8	24	do.	do.	do.	Do.
Thuja Variegata	3	7	do.	do.	do.	Do.
Taxodium Sempervirens	4	6	do.	do.	do.	Slightly injured
Wellingtonia Gigantea	4	6	do.	do.	do.	Uninjured

No. 21.—PRESTONGRANGE, *Haddington*; above Sea-Level, 100 feet; Lowest Indication of Thermometer, —2°; Depth of Snow, about a foot.

Abies Douglasii	25	21	Sandy loam	Clay	N.	Quite hardy
Araucaria Imbricata	13	19	Loamy	do.	W.	Points and extremities discoloured, and sending out young shoots from them.
Aucuba Japonica	5	17	Light	Gravel	do.	Killed to snow (cut over)
Cedrus Deodara	15	20	Loamy	Clay	N.	Quite hardy
Laurel (Bay)	10	25	Rich loam	do.	do.	Do.
Do. (Portugal)	9	30	Sandy loam	do.	do.	Do.
Lauristinus	5	23	Light	Sand	S.	Very much destroyed (cut over)

In regard to the locality of the above, it may be remarked that the ground is undermined by coal-workings at no great distance from the surface, and that there are neither running drains, ditches, nor streamlets within half a mile of the shrubberies or gardens.

No. 22.—Prestonpans, *Haddington;* above Sea-Level, 50 feet; Lowest Indication of Thermometer, —2°; Depth of Snow, about a foot.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Fig Tree	6	12	Light loam	Gravel	S. wall	Little injured. Half young wood of previous year threw out leaves: but the softer part of young wood rotted away, and the young figs dropped off, or curled up like burnt cork, and this season it is barren. Last year, a good crop of green figs ripened without any covering or protection.
Lauristinus	3	10	do.	do.	S.	Quite uninjured and healthy; this may arise from the shelter of a large tree

No. 23.—Bughtrig, *Berwickshire;* above Sea-Level, 220 feet; Lowest Indication of Thermometer, —3°; Depth of Snow, 18 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Abies Douglasii	2 to 3	5	Loam	Clay	S.	Injured, but recovering
Do. Morinda	1 to 2	..	do.	do.	do.	Killed
Alaternus Rhamnus	Various	Various	do.	do.	Open	Do.
Aucuba Japonica	do.	do.	do.	do.	do.	Do.
Cedrus Deodara	12	14	do.	do.	S.	Considerably injured, but sprouting
Do.	4	9	Deep loam	do.	do.	Not much injured (sheltered)
Cedrus Atlantica	9	8	Loam	do.	do.	Much injured, but now thriving
Do.	Small	plants	do.	do.	do.	Do. do.
Cryptomeria Japonica	10	14	do.	do.	Open	Scarcely injured at all
Garrya Elliptica	Various	Various	do.	do.	do.	Killed to ground
Lauristinus	do.	do.	do.	do.	do.	Do. do.
Laurel (Sweet Bay)	do.	do.	do.	do.	do.	Do. do.
Taxodium Sempervirens	13	14	do.	do.	do.	Considerably injured; will recover
Wellingtonia Gigantea	Various	Various	do.	do.	do.	Perfectly hardy

No. 24.—Aytoun Castle, *Berwickshire;* above Sea-Level, 250 feet; Lowest Indication of Thermometer, below zero; Depth of Snow, about 18 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	5 to 8	10	Rich sandy loam	Sand	S.	Nearly all dead
Ilex Aquifolium	3 to 40	50	do.	do.	do.	Much injured
Golden and Silver Holly	50	50	do.	do.	do.	Do.
Dark Smooth-leaved Holly	14	14	do.	do.	do.	Dead
Laurel (Portugal)	10 to 30	14	do.	do.	do.	Nearly all dead. Those replanted two years ago, and others last autumn, have stood the winter much better
Cedrus Deodara	20	15	do.	do.	do.	Nearly dead
Do. Atlantica	5	8	do.	do.	do.	Injured somewhat
Abies Brunoniana	20	6 to 20	do.	do.	do.	Uninjured
Do. Douglasii	10 to 20	14	do.	do.	do.	Do.
Picea Nobilis	4 to 5	8	do.	do.	do.	Do.
Do. Nordmanniana	6	9	do.	do.	do.	Do.
Do. Pinsapo	10	12	do.	do.	do.	Do.

No. 24.—Aytoun Castle, *Berwickshire*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Pinus Occidentalis	8	12	Rich sandy loam	Sand	S.	Dead
Do. Sabiniana	2	5	do.	do.	do.	Do.
Lauristinus	Large	..	do.	do.	do.	Do.
Laurel (common)	10 to 20	14	do.	do.	do.	Dead (small plants uninjured)
Rhododendron Ponticum	6 to 8	20	do.	do.	do.	Uninjured (Hybrid Rhodod. dead)
Roses (standard)	Various	Various	do.	do.	do.	All dead

No. 25.—Wauchope, *Roxburghshire*; above Sea-Level, 600 feet; Lowest Indication of Thermometer, 9°; Depth of Snow, about 14 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	3½	4	Loam	Sandy till	Open	Uninjured
Aucuba Japonica	Various	..	do.	do.	do.	Much injured
Cedar (Red)	10	Various	do.	do.	do.	Uninjured
Cupressus Macrocarpa	4½	9	do.	do.	do.	Do.
Do. Africana	4½	9	do.	do.	do.	Do.
Do. Goveniana	8	10	do.	do.	do.	Killed.
Cedrus Deodara	11	13	do.	do.	do.	Uninjured
Do. Libani	9	11	do.	do.	do.	Do.
Cryptomeria Japonica	3½	7	do.	do.	do.	Do.
Cotoneaster	Various	Various	do.	do.	do.	Do.
Hollies (var.)	do.	do.	do.	do.	do.	Do.
Jasminum Nudiflorum	do.	do.	do.	do.	Wall	Very slightly injured
Jasmine (common)	do.	do.	do.	do.	do.	Uninjured
Juniper (Swedish)	15	15	do.	do.	do.	A few injured, some untouched
Laurel (Portugal)	10 to 12	15 to 20	do.	do.	N.E. and S.S.E.	Not affected near house, but much injured at garden, which is about 50 feet lower, and near a rivulet
Do.	Smaller	Smaller	do.	do.		
Do. (Bay)	As above	As above	do.	do.	do.	Same remarks apply
Pinus Menziesii	12	10	..	..	..	Untouched
Do. Strobus	20	22	..	..	..	Do.
Do. Ponderosa	11	11	..	..	..	Do.
Do. Nobilis	7	10	..	..	..	Do.
Do. Rigida	7	10	..	..	..	Do.
Do. Nordmanniana	8	9	..	..	..	Do.
Do. Cembra	10	11	..	..	..	Do.
Do. Banksiana	25	12	..	..	..	Do.
Do. Austriaca	Various	Various	..	..	..	Do.
Rhododendrons	10	do.	..	..	..	Uninjured at house; browned at garden
Taxodium Sempervirens	2	do.	..	..	..	Uninjured
Tamarix	6½	11	..	..	..	Do.
Wellingtonia Gigantea	2	4	Loam	Sandy till	N.E. and S.S.E.	Do.
Yew (Irish)	10 to 20	10 to 20	do.	do.	do.	Do.
Do. (common)	Various	Various	do.	do.	do.	Do.

No. 26.—Dumcrieff, *Dumfriesshire;* above Sea-Level, 300 ft.; Lowest Indication of Ther., $-7°$; Depth of Snow, about 14 in.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Araucaria Imbricata	5	11	Light loam	Gravel.	S.E.	Never been browned in the least
Aucuba Japonica	2	5	Heavy loam	do.	E.	Last season's wood killed
Apple trees	12	25	Light porous soil	do.	Various on borders & walls	Do not thrive well. Cankered; sprout small
Apricots	..	..	do.	do.	Wall	Will not live. "Gums," and dies out
(Bay) Laurels	13	25	Light loam	do.	Various	Lost top shoots, especially where exposed to the east wind in winter
Laurels (Portugal)	12	25	do.	do.	do.	Where exposed most to east, lost a few leaves and top shoots of young wood
Larch trees	25	25	Light gravelly	do.	do.	Looking at present worse than they have done for some years; the older trees thirty to forty years planted do not appear so unhealthy
Pear trees	12	25	Light porous soil	do.	Various aspects, and on wall	Very healthy, and promise well
Plum trees	12	25	do.	do.	W. & S.E. wall	Looking well in every aspect
Rhododendrons	5	10	Light gravel	do.	Various	Healthy, and flower buds well filled

Near Moffat, the temperature was not lower than $+7°$; and Whins, where shaken naked (from snow) by the wind, killed. The thermometer here indicated 14° lower, although only about four miles distant, but lower elevation.

No. 27.—Drumlanrig, *Dumfriesshire;* above Sea-Level, 186 ft.; Lowest Indication of Ther., $-2°$; Depth of Snow, a few inches.

Forest trees	Various	Various	..	..	..	No death been noticed from effects of frost
Peach trees	do.	do.	..	..	Wall	Suffered very severely

The district being subject to autumn and spring frosts, Coniferæ and finer shrubs not planted. Hardy American plants chiefly grown, which have stood well.

No. 28.—Wanlockhead, *Dumfriesshire;* above Sea-Level, 1334 feet; Lowest Indication of Thermometer, 6°.

Ash trees	Various	10	..	..	Open	No injury done to anything reported on by frost
Beech	do.	10	..	..	do.	Do. do. do.
Elm	do.	10	..	..	do.	Do. do. do.
Lime	do.	10	..	..	do.	Do. do. do.
Laburnum	do.	10	..	..	do.	Do. do. do.
Plane	do.	10	..	..	do.	Do. do. do.
Roses	do.	Various	..	..	do.	Do. do. do.
Gooseberry bushes	..	..	..	..	do.	Do. do. do.

Firs do not thrive at this elevation; but the above are all doing well. They were planted about ten years ago at the Manse. Lower down, at Leadhills, same were planted eight or nine years ago, which have grown but little.

No. 29.—CARGEN, *Kirkcudbright;* above Sea-Level, 80 feet; Lowest Indication of Thermometer, 0° 4′ on 24th December 1860; Depth of Snow, a few inches for a short time only.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Araucaria Imbricata	3 to 6	4 to 6	Stiff loam	Hard till	Various	Some killed; all *much* injured
Aucuba Japonica	3	2 to 3	do.	do.	do.	Killed to the ground; coming from roots
Cryptomeria Japonica	6 to 7	4 to 6	do.	do.	do.	All killed
Cupressus Funebris	2 to 4	3 to 4	do.	do.	do.	Do.
Ilex, Hollies	Old plants	Old plants	do.	do.	do.	Much injured
Laurus Nobilis (Sweet Bay)	do.	do.	do.	do.	South	Do.
Laurel (Portugal)	do.	do.	do.	do.	Various	Do.
Laurustinus	4	2 to 3	do.	do.	do.	All killed
Common Laurel	Old plants	Old plants	do.	do.	do.	Much injured
Quercus Ilex	do.	do.	do.	do.	do.	Lost much foliage
Rhododendron (Hybrids)	do.	do.	do.	do.	do.	Some killed; all injured
Roses, Hybrid standard	do.	do.	do.	do.	do.	Many killed, and remainder much injured
Roses, common old	do.	do.	do.	do.	do.	All killed
Taxodium Sempervirens	7 to 8	5	do.	do.	do.	Some killed; all much injured
Peach trees	Old plants	Old plants	do.	do.	South wall	Much injured
Nectarines	do.	do.	do.	do.	do.	Killed
Apricots	do.	do.	do.	do.	do.	Much injured
Abies Morinda	..	..	..	..	Various	Much injured at 200 feet altitude on a hill
Pinus Excelsa	..	..	..	..	do.	Uninjured at 200 feet altitude on a hill
Wellingtonia Gigantea	..	..	..	..	do.	Not in the least injured, although exposed at 200 feet altitude
Cedrus Deodara	..	..	..	..	do.	Suffered slightly at 200 feet altitude

No. 30.—CASTLE KENNEDY, *Wigtonshire;* above Sea-Level, 100 feet; Lowest Indication of Thermometer, 16°, 23d December; Depth of Snow, very little.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	15	17	Gravelly loam	Porous gravel.	S.E.	Uninjured
Abies Menziesii	21	14	do.	do.	N.	Do.
Do. Orientalis	15	12	do.	do.	do.	Do.
Do. Taxifolia	6	6	do.	do.	do.	Do.
Do. Morinda	15	12	do.	do.	S.W.	Do.
Do. Brunoniana	5½	7	do.	do.	S.	Buds frosted. (Happens every year)
Do. Religiosa	12	11	do.	do.	N.	Slightly injured
Do. Pattonii	1	2	do.	do.	do.	Uninjured
Do. Douglasii	20	8	do.	do.	S.	Do.
Biota Glauca	2	4	do.	do.	do.	Do.
Cedrus Deodara	17	17	do.	do.	N.E.	Do.
Cephalotaxus Fortunii	2¼	5	do.	do.	N.	Do.
Picea Webbiana	7	10	do.	do.	S.W.	Do.
Do. Pichta	10	12	do.	do.	N.W.	Do.
Do. Pinsapo	10	12	do.	do.	N.	Do.
Do. Fraseri	11	12	do.	do.	do.	Do.
Do. Cephalonica	10	8	do.	do.	do.	Do.

No. 30.—Castle Kennedy, *Wigtonshire*—Continued.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Picea Nordmanniana	8½	12	Gravelly loam	Porous gravel	S.	Uninjured
Do. Grandis	3	7	do.	do.	do.	Do.
Do. Nobilis	14	12	do.	d .	do.	Do.
Do. Pindrow	6	7	do.	d .	do.	Do.
Do. Cilicica	½	1	do.	d .	N.	Do.
Do. Lasiocarpa	1½	2	do.	do.	do.	Do.
Pinus Coulterii	13	14	do.	do.	do.	Do.
Do. Jeffreyii	2	4	do.	do.	S.	Do.
Do. Pungens	2½	3	do.	do.	N.	Do.
Do. Excelsa	13	12	do.	do.	S.E.	Do.
Do. Rigida	12	12	do.	do.	do.	Do.
Do. Pyrenaica	12	12	do.	do.	do.	Do.
Do. Inops	5½	10	do.	do.	do.	Do.
Do. Muricata	4	5	do.	do.	S.	Do.
Do. Insignis	15½	8	do.	do.	N.W.	Do.
Do. Montezumæ	13½	14	do.	do.	S.W.	Do.
Do. Hartwegii	12	13	do.	do.	do.	Do.
Do. M'Intoshii	1½	3	do.	do.	N.	Do.
Do. Rudis	7	10	do.	do.	S.	Do.
Do. Gordoniana	8	7	do.	do.	do.	Do.
Do. Romana	15	12	do.	do.	do.	Do.
Do. Benthamiana	9	7	do.	do.	do.	Do.
Do. Radiata	7	5	do.	do.	do.	Do.
Thujopsis Borealis	2	3	do.	do.	do.	Do.
Thuja Cupressoides	1½	3	do.	do.	do.	Considerably injured
Do. Craigiana	1½	2	do.	do.	do.	Uninjured
Trees and shrubs	..	..	..	..	..	In general uninjured

No. 31.—Ginoch, *Wigtonshire*; above Sea-Level, 40 to 50 ft.; Lowest Indication of Ther., below zero; Depth of Snow, little.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Laurels (Sweet Bay)	20	Old plants	Rich loam	Sandy clay	Sheltered	Killed to the ground
Quercus Ilex	20	do.	do.	do.	do.	Do. do.
Many other old shrubs	..	..	..	..	do.	Do. do.

This place is within four miles of Castle Kennedy, but about 50 to 60 feet lower elevation, and four miles nearer the sea. At Castle Kennedy almost nothing is touched (the soil being very poor, and higher elevation), while here, in a garden well sheltered by old wood, damage is great. Castle Kennedy experienced less cold by fully 16°.

No. 32.—Milrig (Nr. Kilmarnock), *Ayrshire*; above Sea-Level, 448 ft.; Lowest Indication of Ther., $-3\frac{1}{2}°$; Depth of Snow, 2 in.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	5	8	Heavy loam	Clay.	N.	Little damaged
Do. do.	8	10	do.	do.	S.W.	Uninjured
Berberis Japonica	1 to 2	3	do.	do.	S.	Foliage much damaged, but stood well
Do. Intermedia	1 to 2	3	do.	do.	do.	Stood well; young leaves killed
Cedrus Deodara	6	8	do.	do.	W.	Lost last year's wood

No. 32.—Milrig (Nr. Kilmarnock), *Ayrshire*—Continued.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Rhododendron Hybrid	3	8	Heavy loam	Clay	N.	Foliage suffered, and on May 12th the young leaves killed by frost.
Do. Campanulatum	3	8	do.	do.	do.	Do. do. do.
Do. Nobleanum	3	8	do.	do.	do.	Do. do. do.
Escallonia	3	8	do.	do.	do.	Young wood killed
Roses	Various	Various	do.	do.	E.	Suffered very much; cut back to a foot, and now breaking: Hybrid Perpetua and some other sorts, killed to the ground

No. 33.—Blythswood, *Renfrewshire*; above Sea-Level, 6 feet; Lowest Indication of Thermometer, – 9°; Depth of Snow, a few inches.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Aucuba Japonica	1 to 12	3 to 20	Clay loam	Sandy	Various	Killed to ground
Arbutus Unedo	8	10	do.	do.	West wall	Killed. Trained on wall
Araucaria Imbricata	2 to 15	11	do.	do.	Various	Killed
Berberis Dulcis	8	10	do.	do.	E. wall	Killed to the ground
Ceanothus Papillosus	3	5	do.	do.	W. wall	Do. do.
Cedrus Deodara	2 to 17	4 to 13	do.	do.	Various	Lost all foliage; but safe
Do. Libani	30	4 to 13	do.	do.	do.	Do. do.
Cistus Lusitanicus	8	6	do.	do.	S. wall	Killed
Cotoneaster Affinis	5	4	do.	do.	W. wall	Killed to ground
Do. Rotundifolia,	8	12	do.	do.	do.	Do. do.
Do. Vulgaris	8	12	do.	do.	do.	Do. do.
Cryptomeria Japonica	14	9	do.	do.	N.	Lost last year's growth
Coronilla Emerus	16	15	do.	do.	E. wall	Killed to the ground
Daphne Cneorum	2	5	do.	do.	S. wall	Killed
Escallonia Macrantha	8	6	do.	do.	W. wall	Do.
Erica Mediterranea	9 in.	8	do.	do.	Various	Do.
Garrya Elliptica	8	14	do.	do.	do.	Killed to ground
Gynereum Argenteum	8	3	do.	do.	E. wall	Killed
Hedera (var.)	1 to 60	2 to 30	do.	do.	Var.	Lost all its foliage
Ilex Latifolia	25	15	do.	do.	E.	Killed
Do. Furcata	4	8	do.	do.	N.	Much hurt
Do. Argentea	4	60	do.	do.	do.	Do. do.
Jasminum (Elba)	16	15	do.	do.	E. wall	Killed to the ground
Laurus Nobilis	8	14	do.	do.	do.	Killed
Do. (Bay)	2 to 13	8 to 40	do.	do.	Various	Killed to the ground
Do. (Portugal)	4 to 22	4 to 50	do.	do.	do.	Do. do.
Ligustrum Vulgare	2 to 8	2 to 13	do.	do.	do.	Much hurt
Magnolia Grandiflora	2	4	do.	do.	S. wall	Killed
Pernettia Prostrata	1½	10	do.	do.	S.	Killed to the ground
Ruscus Aculeatus	2	12	do.	do.	N.	Do. do.
Wellingtonia Gigantea	2 to 14	5	do.	do.	Various	Much hurt
Yucca Gloriosa	5	6	do.	do.	do.	Killed

No. 34.—BAROCHAN, *Renfrewshire;* above Sea-Level, 150 ft.; Lowest Indication of Thermometer, −12°; Depth of Snow, a few inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet	years,				
Araucaria Imbricata	2	9	Light loam	Red till	S.	Entirely killed
Aucuba Japonica	4	8	do.	do.	N.	Do. do.
Cedrus Deodara	7	15	do.	do.	do.	Lost all its foliage
Abies Morinda	22	30	do.	do.	do.	Entirely killed
Daphne Pontica	4	10	do.	do.	S.	Do. do.
Ilex Aquifolium	26	30	do.	Strong till	N.	All but dead
Do. Latifolia	20	26	do.	do.	E.	Lost nearly all its foliage
Do. (variegated)	14	20	do.	Blue clay	N.	All but dead
Laurel (Portugal)	24	40	do.	Rock	S.	Entirely killed
Laurel (Bays)	12	20	do.	Red till	do.	All but dead
Ribes Speciosum	6	8	do.	do.	do.	Killed to the ground
Whin (double flowering)	4	6	do.	do.	do.	Entirely killed

No. 35.—ELDERSLIE HOUSE, *Renfrewshire;* above Sea-Level, a very few ft.; Lowest Indication of Ther., −6°; Depth of Snow, 6 in.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	9	22	Heavy loam	Bluish silt	N.	Apparently killed to ground
Hollies, common	6 to 20	Old	do.	Sand	do.	Very severely injured
Do. variegated	do.	do.	do.	do.	do.	*Most* severely injured. Wood beneath bark discoloured; but show signs of budding on branches —[One smooth-leaved holly escaped uninjured]
Laurels (Bays)	Various	Old plants	do.	Bluish silt	do.	Entirely killed to ground
Do. (Portugal)	do.	do.	do.	Sand	do.	Do. do. do.
Pears, plums, and peaches	..	Old trees	do.	do.	On wall	Very much injured
Apples	Various	Various	do.	do.	do.	Apparently not much injured, but effects will not be known for some time.—[On examination, wherever there is a bud there is found a brownish speck beneath]
Rhododendron Ponticum,	do.	do.	do.	do.	N.	Seriously injured; in many cases dead
Do. Catawbiense	do.	do.	do.	do.	do.	Little injured; flower buds only destroyed
Taxus Baccata	do.	do.	do.	do.	do.	Very little injured
Do. Fastigiata	do.	do.	do.	do.	do.	Do. do.
Buxus Sempervirens	do.	do.	do.	do.	do.	Do. do.
Aucuba Japonica	..	..	..	..	..	Killed to the ground, and all roses killed to ground
Chionanthus Fragrans	..	..	..	..	S. wall	Very much injured
Glycine Sinensis	..	..	..	..	do.	Apparently uninjured

In many places Ivy has been killed, especially where used to cover an open railing; but while much injured, it will recover wherever it is on walls.

No. 36.—CRAIGENDS, *Renfrewshire;* Lowest Indication of Thermometer, 4° on 24th December; Depth of Snow, a few inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	4	6	Light sandy loam	Freestone rock	S.	Dead
Aucuba Japonica	3	10	do.	do.	do.	Dead to the ground (springing)
Cupressus Lambertiana	3	6	do.	do.	E.	Killed.
Gum Cistus	2 to 3	5	do.	do.	do.	Do.

No. 36.—Craigends, *Renfrewshire*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Hollies (various)	8 to 30	5 to 50	Light sandy loam	Freestone rock	E.	Killed to stem (springing)
Laurels Bay	1 to 6	10	do.	do.	do.	Killed to ground (cut over)
Do. (Portugal)	20	30	do.	do.	do.	Do. do. (do.)
Peach Trees	Various	Various	do.	do.	S. wall	Much injured, lost flower buds
No. 37.—Greenock Cemetery, *Renfrewshire*; above Sea-Level, 83 to 307 feet; Lowest Indication of Ther., 11°; Depth of Snow, 6 ins.						
Abies Orientalis	10	15	Light	Soil	W.	Stood well
Do. Douglasi	9	20	do.	do.	do.	Do.
Do. Khutrow	14	12	do.	do.	E.	Do.
Do. Pyramidalis	9	10	do.	do.	S.	Do.
Do. Canadensis	6	8	do.	do.	do.	Do.
Do. Brunoniana	4	6	do.	do.	do.	Do.
Do. Pinsapo	4	6	do.	do.	do.	Do.
Araucaria Imbricata	1 to 10	Various	do.	do.	Various	Above 300 plants stood well; a few only slightly browned on top shoots
Cupressus Funebris	4	10	do.	Mossy	W.	Suffered a little
Do. Goveniana	6	8	do.	Soil	S.W.	Do. do.
Do. Macrocarpa	10	12	do.	do.	W.	Stood well.
Do. Lawsonii	2	4	do.	do.	S.W.	Do.
Cryptomeria Japonica	10	12	do.	do.	W.	Do.
Cedrus Africana	4 to 10	Various	do.	do.	Various	Do.
Do. Libani	4 to 10	do.	do.	do.	do.	Do.
Do. Deodara	4 to 10	do.	do.	do.	do.	Do.
Garrya Elliptica	5	7	do.	do.	S.W.	Do.
Juniperus Sinensis	2	4	do.	do.	Various	Do.
Do. Hibernica	2	4	do.	do.	do.	Do.
Do. Sabina	2	4	do.	do.	do.	Do.
Do. Prostrata	1	2	do.	do.	do.	Do.
Do. Tamariscifolia	1	2	do.	do.	do.	Do.
Kalmia Rubra	2	8	Mossy	Rock	W.	Do.
Do. Latifolia	10	20	Loam	Clay	E.	Do.
Do. Glauca	2	5	Light	Mossy	S.	Do.
Libocedrus Chilensis	6	14	do.	Loam	W.	Do.
Picea Nobilis	9	12	do.	do.	Various	Do.
Do. Nordmanniana	6	8	do.	do.	do.	Do.
Do. Webbiana	5	7	do.	do.	do.	Suffered considerably
Pinus Cembra	8	10	do.	do.	do.	Stood well
Do. Nana	1	3	do.	do.	do.	Do.
Do. Strobus	9	13	do.	do.	do.	Do.
Do. Pinaster	12	15	do.	do.	do.	Do.
Do. Pyrenaica	14	10	do.	do.	do.	Do.
Do. Benthamiana	5	3	do.	do.	do.	Do.
Do. Pumilo	7	9	do.	do.	do.	Do.

No. 37.—Greenock Cemetery, *Renfrewshire*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Pinus Macrocarpa	6	9	Light	Loam	Various	Stood well
Do. Sinensis	Various	Various	do.	do.	do.	Suffered considerably
Rhododendron Hybrid	do.	do.	do.	do.	do.	Several hundreds all quite hardy
Do. Sikkhim	do.	do.	do.	do.	do.	Do. do. do.
Thuja Aurea	1	6	Loam	Clay	W.	Stood very well
Do. Occidentalis	9	12	Light	Soil	S.W.	Do.
Do. Gigantea	4	7	do.	do.	W.	Do.
Do. Pendula	3	6	do.	do.	E.	Do.
Thujopsis Borealis	3	7	Loam	Clay	E.	Do.
Taxodium Distichum	2	10	Light	Soil	W.	Do.
Do. Sempervirens	12	12	do.	do.	do.	Do.
Wistaria Sinensis	20	10	do.	Trap rock	S. wall	Do.
Weigelia Rosea	4	6	do.	do.	S.W.	Do.
Wellingtonia Gigantea	9	7	do.	Loamy	E.	Do.

The greater portion of the Cemetery ground is Whinstone Rock, originally cropping out above the ground, but now covered over with light soil; in some places mixed with loam, in other places with moss and clay, but almost in every part a *rocky bottom*, at from 10 inches to 7 feet below the surface.

No. 38.—Orchard, *Lanarkshire;* above Sea-Level, 220 feet; Lowest Indication of Ther., below zero; Depth of Snow, a few inches.

Portugal Laurel	18	40	Clay	Clay	S.W.	Perfectly safe
Do. do.	12	20	Light soil	Light	W.	Killed to ground

These plants were about 100 yds. from the Clyde, the larger plant a good deal higher than the other above the level of the river (100 yds. separate).

Bay Laurels	7	20	Forced	Clay	S.W.	Partially injured
Rhododendrons	$3\frac{1}{2}$	20	do.	Forced	S.W.	Partially injured
Whins	..	..	..	..	..	Old stocks wholly gone; last season's plants healthy
Roses	..	..	..	..	..	Generally gone in all aspects
Plum trees	Various	Various	Forced	Forced	S.	Last year's wood killed
Pear Scions	..	..	..	..	..	So much damaged as to be useless
Jasmine	Various	Various	Forced	Forced	Wall	Totally lost

No. 39.—Brownlee, *Lanarkshire;* above Sea-Level, 250 feet, and 100 above *Clyde;* Lowest Indication of Thermometer, below zero on 23d December; Depth of Snow, about a foot; the *greatest* fall of snow happened to lie during *greatest* cold.

Apple trees	Various	Various	Various	Various	Open	Very little apparent damage
Pear trees	do.	do.	do.	do.	do.	A good deal frosted on branches
Plum trees	do.	do.	do.	do.	do.	Suffered very much
Gooseberry bushes	do.	do.	do.	do.	do.	Uninjured

Of all the fruit trees the Plums have suffered most; some young plants from 2 to 6 years old are totally killed. The Pears too have suffered, but the full extent of damage cannot yet be specified. The frost covering equally all soils, its damage is pretty equally distributed in each class, but in one spot it is more severe in its devastation—namely, on a black soil, and very wet, although repeatedly drained; the subsoil being a mud bed, the drains choke; three trees here are completely killed.

No. 40.—MILTON-LOCKHART, *Lanarkshire*; above Sea-Level, 200 feet; Lowest Indication of Thermometer, −8° on 24th December; Depth of Snow, about 14 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Aucuba Japonica	3 to 4	Various	Clay loam	Gravel subsoil	Open	Killed back to snow line
Araucaria Imbricata	5 to 6	..	do.	do.	Various	Killed
Cedrus Lebani	16 to 20	..	do.	do.	do.	Last year's shoots bitten
Do. Deodara	12 to 14	..	do.	do.	do.	Points of branches dead
Laurel (Portugal)	12 to 16	..	do.	do.	do.	Killed to the ground
Laurel (common)	10 to 12	..	do.	do.	do.	Points of branches dead; springing at stem
Quercus Ilex	16 to 20	..	do.	do.	do.	A good deal injured, but less than the above
Peach trees	Various	..	do.	do.	Wall	Lost all last year's wood
Rhododendron (Hybrids)	do.	..	do.	do.	Open	Destroyed totally
Roses	do.	..	do.	do.	Open and wall	Suffered very severely

The North side generally most scorched of the Evergreens. Plants on the strong clay loam less injured than on sandy loam. A porous clay seems best subsoil.

No. 41.—BRAIDWOOD and CARLUKE, *Lanarkshire*; above Sea-Level, 500 to 560 feet; Lowest Indication of Thermometer, 23d Dec. the coldest, mercury into the *bulb* of thermometer; Depth of Snow, about a foot.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Bays (Laurels)	Various	Various	Clay	Clay	Open	Quite safe and healthy
Portugal Laurels	do.	do.	do.	do.	do.	Do. do.
Rhododendrons	do.	do.	do.	do.	do.	Quite safe

Fruit grafts of last year have been bit, and half the shoot destroyed, but the leaf is expanding near the stem.—The damage in both places is no greater than in any ordinary year to the Laurels and Rhododendrons.—Fruit "Flourish" is "nizart," and the *pith* of the flower-bud on examination is found *black*. Some twigs show this disposition also.—Nothing wrong with plantations has been noticed.

No. 42.—HAMILTON PALACE, *Lanarkshire*; Depth of Snow, 18 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	6	15	Strong	Clay	Various	Killed outright
Cedrus Lebani	40	80	do.	do.	do.	Do.
Do. Deodara	12	15	do.	do.	do.	Do.
Ilex (various)	30	80	do.	do.	do.	Killed back to main stem, and many to the ground
Ilex (variegated)	40	100	do.	do.	do.	Entirely killed
Laurel (common	16	30	do.	do.	do.	Killed to the ground
Do. Portugal	15	40	do.	do.	do.	Do. do.
Quercus Ilex	20	30	do.	do.	do.	Do. do.
Privet	10	20	do.	do.	do.	Killed
Common Yew	Various	Various	do.	do.	do.	Tops killed, some of them to half-way down main stem

No. 43.—DARNHALL, *Peeblesshire*; above Sea-Level, 800 feet; Lowest Indication of Ther.,—7°; Depth of Snow, 7 in.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	8	10	Sandy loam	Gravel	S.	All killed to the ground
Abies Orientalis	5	10	do.	do.	do.	Hardy
Do. Morinda	5	10	do.	do.	do.	Hardy where grown on stiff soil

No. 43.—Darnhall, *Peeblesshire*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Abies Douglasi	12	12	Sandy loam	Gravel	S.	Hardy where grown on stiff soil
Cedrus Atlantica	6	12	do.	do.	do.	Leader lost
Do. Deodara	8	14	do.	do.	do.	Leader lost, and a good deal injured
Cupressus Lambertiana	4	6	do.	do.	do.	All killed
Do. Funebris	6	8	do.	do.	do.	Do.
Do. Thyoides	6	10	do.	do.	do.	Do.
Do. Lawsonii	4	Notknown	do.	do.	do.	Quite hardy—the best of its class
Ilex Shepherdi	6	10	do.	do.	do.	Killed
Ilex Aquifolium	6	10	do.	do.	do.	Do.
Juniperus Recurva	6	10	do.	do.	do.	Almost all killed
Do. Sinensis	6	19	do.	do.	do.	A good deal hurt
Pinus Nobilis	12	14	do.	do.	do.	Hardy
Do. Banksiana	12	14	do.	do.	do.	Do.
Do. Strobus	8	12	do.	do.	do.	Do.
Do. Ponderosa	12	14	do.	do.	do.	Do.
Do. Lambertiana	6	12	do.	do.	do.	Do.
Do. Pyrenaicum	8	12	do.	do.	do.	Do.
Do. Monticola	3½		do.	do.	do.	Do.
Do. Jeffreyii	1½	4	do.	do.	do.	Do.
Do. Grandis	2	6	do.	do.	do.	Do.
Do. Fischeri	8	10	do.	do.	do.	Do.
Do. Taurica	9	10	do.	do.	do.	Do.
Do. Hookeriana	2	4	do.	do.	do.	A little injured
Picea Pinsapo	6	12	do.	do.	do.	Leader lost
Do. Nordmanniana	2	Notknown	do.	do.	do.	Hardy
Thuja Gigantea	3	6	do.	do.	do.	Quite hardy
Taxodium Sempervirens	6	12	do.	do.	do.	All killed to the snow-line
Wellingtonia Gigantea	3	6	do.	do.	do.	Slightly brown with the frost
No. 44.—Stobo Castle, *Peeblesshire;* above Sea-Level, 600 feet; Lowest Indication of Ther.,—10°; Depth of Snow, 14 inches.						
Hollies	20 to 30	50	Light loam	Stiff clay	S.	Half leaves fallen; many branches dead
Laurels	10	20	do.	do.	do.	Killed to the ground
Pines (various)	12	14	do.	do.	do.	Have all stood well
Roses (standards and climbers)	..	..	..	..	..	All dead to the ground
Forest trees	Various	Various	do.	do.	do.	Appear to have stood well
No. 45.—Coney Park Nursery, *Stirlingshire;* above Sea-Level, 50 to 70 feet; Lowest Indication of Thermometer,—5° on 24th December; Depth of Snow, 4 inches.						
Pinus Insignis	1½	4 to 6	Light	Gravel	S.	All killed
Araucaria Imbricata	1¼ to 3½	4 to 9	do.	do.	Various	Some killed; all very much cut up
Alaternus Rhamnus	1½ to 2	..	do.	do.	S.	Killed

No. 45.—Coney Park Nursery, *Stirlingshire*—Continued.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Aucuba Japonica	1½ to 2½	..	Deep loam and light soil	Gravel	Various	Much injured, but none dead
Berberis Darwinii	2	..	Deep loam	do.	W.	Partially injured; some killed
Do. Fortunii	2½	..	do.	do.	N.	Killed to the ground; roots of some in life
Bay Laurel	1 to 2	5	Light	do.	S.	A good many killed, and all to the ground
Bay (sweet)	1 to 2	..	do.	do.	do.	Many dead; all a good deal cut up
Cedrus Deodara	2 to 5	5 to 10	do.	do.	Various	Top and side shoots much injured
Cupressus Lambertiana	2 to 3	..	do.	do.	S.	Killed
Do. Goveniana	2 to 3	..	do.	do.	do.	Do.
Do. M'Nabiana	2 to 3	..	do.	do.	do.	Do.
Do. Torulosa	2 to 3	..	do.	do.	do.	Do.
Cotoneaster	..	..	do.	do.	do.	Standards killed; dwarfs safe
Lauristinus	1½	..	do.	do.	W.	All killed
Phillyrea (various)	1 to 7	..	do.	do.	S.	Killed; roots of large plants in life
Pyracantha	1½	..	Deep loam	do.	E.	A good deal cut up
Portugal Laurel	2 to 5	6 to 12	Light	do.	S.	Browned—otherwise little hurt
Standard Roses	..	..	do.	do.	do.	Many killed

The Araucarias have been pruned back as far as dead; in some cases the side shoots are breaking afresh. Young plants entirely killed down; headed down to ground, and now all springing.—Cedrus Deodara has been cut back to the fresh wood, and is now coming. There have been a few deaths, but not many. Large plants of Portugal and Bay Laurels planted out in mixed borders; the Portugals nothing scathed, but the Bays lost *last* year's wood. They are in all exposures.

No. 46.—Camis-Eskan, *Dumbartonshire;* above Sea-Level, a very few ft.; Lowest Indication of Ther., 10°; Depth of Snow, a few inches.

Arbutus Unedo	3	10	Sandy	Gravel	Open	Killed
Lauristinus	6	10	do.	do.	do.	Dead to ground
Laurel (Bay)	4	8	do.	do.	do.	Killed to ground
Laurel (Portugal)	Various	Various	do.	do.	do.	Safe; browned slightly
Menziesia Cœrulea	2	10	do.	do.	do.	Killed
Do. Globularis	..	..	do.	do.	do.	Do.
Irish Heaths—Menziesia Polifolia	2	10	do.	do.	do.	Do.
Standard Roses	2	Various	do.	do.	do.	Very much cut up

No. 47.—Cambus Cottage, *Clackmannanshire;* above Sea-Level, 50 ft.; Lowest Indication of Ther., 6°; Depth of Snow, 4 inches.

Abies Douglasi	5 to 7	10	Damp clay	Clay	S.	Quite uninjured
Do. Morinda	5 to 7	10	do.	do.	do.	Do.
Araucaria Imbricata	7	13	do.	do.	do.	Do.
Arborvitæ (various)	Various	Various	do.	do.	do.	Browned in foliage
Alaternus (blotch-leaved)	do.	do.	do.	do.	do.	Do.
Aucuba Japonica	do.	do.	do.	do.	do.	Do.
Arbutus Unedo	do.	do.	do.	do.	do.	Do.
Cedrus Rubra	do.	do.	do.	do.	do.	Do.

No. 47.—Cambus Cottage, *Clackmannanshire*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Cedrus Deodara	5 to 14	13	Damp clay	Clay	S.	Quite uninjured
Cupressus Funebris	5 to 14	13	do.	do.	do.	Browned on foliage
Cryptomeria Japonica	8	9	do.	do.	do.	Stood well
Lauristinus	Various	Various	do.	do.	do.	Killed to the ground
Laurel (Portugal)	do.	do.	do.	do.	do.	Foliage somewhat browned
Do. (Bay)	do.	do.	do.	do.	do.	Do. do.
Taxodium Sempervirens	5	8	do.	do.	do.	Stood well
Thuja Macrophylla	1	3	do.	do.	do.	Do.
Do. Gigantea	1	3	do.	do.	do.	Do.
Wellingtonia Gigantea	1	3	do.	do.	do.	Do.

No. 48.—Orwell Parish, *Kinross-shire;* above Sea-Level, 300 to 400 ft.; Lowest Indication of Ther.,—3°; Depth of Snow, about 12 in.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	2 to 7	8 to 10	Ordinary mould	Channel & whinstone	Open	Two thirds destroyed
Cedrus Deodara	2 to 4	..	do.	do.	do.	A good deal injured—recovering
Hollies (various)	Various	Various	..	..	..	Young plants destroyed; older uninjured
Lauristinus	2 to 5	8 to 10	do.	do.	do.	Many killed, others killed to ground
Laurels (Bays)	2 to 10	Old plants	do.	do.	do.	Much injured; many killed
Do. (Portugal)	2 to 10	do.	do.	do.	do.	A good deal injured
Pines (various)	Various	Various	do.	do.	do.	Many destroyed. The injured parts having been cut off, the plants which were not totally dead have recovered greatly, and made a good growth this summer
Forest trees	..	..	..	..	..	Generally have not suffered materially
Whins and broom	..	..	..	..	..	Both almost entirely cut down; very little *bloom* of either

The above remarks apply to plants in an altitude varying from 300 to 400 feet above sea-level, chiefly exposed to S. and W. The lower districts, especially in the neighbourhood of Loch Leven, suffered most. At Orwell, for instance, less injury was done than at Kinross, though the latter is from 50 to 60 feet lower.

No. 49.—Cambo, *Fife;* above Sea-Level, about 50 feet; Lowest Indication of Thermometer, below zero, but not ascertained (mercury into bulb!); Depth of Snow, about a foot.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Budlea Globosa	15	30	Black loam	Gravelly	E.	Killed
Bay (sweet)	28	60	do.	do.	S.	This magnificent specimen killed apparently to roots, but now is springing. It was similarly injured in winter of 1821
Buxus Sempervirens	4	9	do.	do.	Open	Killed
Lauristinus	14	30	do.	do.	Sheltered	Killed down to roots
Picea Pectinata	15	11	do.	do.	do.	Totally killed in *plantations*
Solanum Scandens	15	16	do.	do.	S.	Killed in a shrubbery well sheltered
China Roses	..	..	..	..	..	The shoots of these have all perished

No. 50.—Kinneddar, *Fife*; above Sea-Level, 515 feet; Depth of Snow, about a foot.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Arbutus Unedo	3	3 to 10	Clay	Clay	S.	Severely injured. Cut down
Cistus	5	3 to 10	do.	do.	W.	Do. do.
Cedrus Deodara	Various	Various	do.	do.	Various	Stood well
Lauristinus	4	do.	do.	do.	N.	Killed to ground
Laurels	10	do.	do.	do.	do.	Do.
Pinus Cembra	Various	do.	do.	do.	Open	Stood well
Do. Excelsa	do.	do.	do.	do.	do.	Do.
Do. Canadensis	do.	do.	do.	do.	do.	Severely injured
Abies (various)	do.	do.	do.	do.	do.	Stood well
Roses	..	..	..	..	..	Have suffered more than anything; many totally lost
Peach and Apricot trees	..	..	..	..	..	Have suffered very much; young shoots and blossom buds killed

No. 51.—Bandrum, *Fife*; above Sea-Level, 300 feet; Lowest Indication of Ther., about zero (not registered); Depth of Snow, 12 to 14 in.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Laurels (Sweet Bay)	8	20	Clay	Clay	S.	Suffered very severely. Cut down
Lauristinus	5	10	do.	do.	do.	Do. do.
Roses	Various	Various	do.	do.	do.	Much injured; sprouting from roots
Solanum Amazonicum	..	..	do.	do.	do.	Completely destroyed
Coniferæ	Various	Various	..	..	..	Have all stood the winter well

No. 52.—Fordell, *Fife*; above Sea-Level, 256 feet; Lowest Indication of Thermometer, zero; Depth of Snow, 20 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	12	10	Loam	Gravelly	S.	Slightly injured
Abies Mertensiana	4	5	do.	do.	N.	Uninjured
Cupressus Lawsoniana	2	4	do.	do.	S.	Do.
Do. Lambertiana	8	7	do.	do.	E.	Nearly killed
Do. Goveniana	6	7	do.	do.	S.	Do.
Cedrus Deodara	20	14	do.	do.	do.	Uninjured
Cephalotaxus Fortunii	4	6	do.	do.	N.	Do.
Cedrus Smithiana	3	4	do.	do.	E.	Slightly injured
Fitzroya Patagonica	3	4	do.	do.	do.	Nearly killed
Picea Nobilis	6	6	do.	do.	S.	Uninjured
Do. Amabilis	2	4	do.	do.	E.	Do.
Pinus Insignis	5	6	do.	do.	N.	Killed
Do. Radiata	1	3	do.	do.	do.	Uninjured
Picea Nordmanniana	4	5	do.	do.	E.	Do.
Pinus Monticola	4	5	do.	do.	S.	Do.
Do. Benthamiana	6	7	do.	do.	do.	Do.
Do. Tæda	3	4	do.	do.	do.	Do.
Thujopsis Borealis	3	4	do.	do.	do.	Do.
Taxodium Sempervirens	12	9	..	..	N.	Slightly injured
Wellingtonia Gigantea	10	8	..	..	N.E.	Uninjured

No. 53.—Inzievar, *Fife;* above Sea-Level, about 200 ft.; Lowest Indication of Ther., 3° on 24th Dec.; Depth of Snow, 8 in.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Aucuba Japonica	3	5	Stiff and retentive.	Cold stiff clay	Open	Killed to snow-line
Araucaria Imbricata	Various	Various	do.	do.	do.	Points of branches frozen, but now *fresh*
Cedrus Deodara	do.	do.	do.	do.	do.	Suffered none
Lauristinus	3	5	do.	do.	do.	Killed to the ground
Roses	Various	5	do.	do.	do.	Do. do.

No. 54.—Colinswell, *Fife;* above Sea-Level, 50 feet; Lowest Indication of Thermometer, about zero; Depth of Snow, 7 to 9 inches.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	Various	Various	Light	Sand	S.	Uninjured
Arbutus Unedo	do.	do.	do.	do.	do.	Do.
Agapanthus Umbellatus	do.	do.	do.	do.	do.	Quite hardy
Pines (various)	do.	do.	do.	do.	do.	Uninjured
Lauristinus	do.	do.	do.	do.	do.	Do.
Laurel (Portugal)	do.	do.	do.	do.	do.	Do.
Do. (Bay)	do.	do.	do.	do.	do.	Slightly injured
Roses	do.	do.	do.	do.	do.	Slightly. Injured parts cut off

No. 55.—Ruthven House, *Forfarshire;* above Sea-Level, about 150 ft.; Lowest Indication of Ther., 2°; Depth of Snow, about 2 ft.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	4	6	Sandy loam	Sand and gravel	S.	Killed
Arbutus Unedo	4	5	do.	do.	do.	Do.
Aucuba Japonica	Various	Various	do.	do.	do.	Do.
Budlea Globosa	do.	do.	do.	do.	do.	Do.
Cupressus Torulosa	5	6	do.	do.	do.	Do.
Do. Lambertiana	4	5	do.	do.	do.	Do.
Lauristinus	Various	Various	do.	do.	do.	Do.
Laurels (Bay)	do.	do.	do.	do.	do.	Do.
Laurel (Sweet Bay)	do.	do.	do.	do.	do.	Do.
Pinus Cembra	20	20	do.	do.	do.	Uninjured
Do. Maritima	17	16	do.	do.	do.	Do.
Do. Pinaster	2	4	do.	do.	do.	Do.
Do. Weymouth	30	50	do.	do.	do.	Do.
Do. Pinsapo	16	16	do.	do.	do.	Do.
Do. Excelsa	10	12	do.	do.	do.	Do.
Piptanthus Nepaulensis	..	..	do.	do.	do.	Killed

No. 56.—Fort Nurseries, Broughty Ferry, *Forfarshire;* above Sea-Level, 100 to 150 feet.

Species reported on.	Height.	Supposed or known age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Arbutus Unedo	2	Various	Fine loam	Gravel	S. & E.	Killed to snow-level
Alaternus Rhamnus	2	do.	do.	do.	do.	Injured
Andromeda Floribunda	1½	do.	do.	do.	do.	Sound
Arborvitæ Americana	6	do.	do.	do.	do.	Do.
Do. Siberian	3	do.	do.	do.	do.	Do.
Do. Chinese	2	do.	do.	do.	do.	Injured

No. 56.—Fort Nurseries, Broughty Ferry, *Forfarshire*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years				
Arborvitæ Aurea	1½	Various	Fine loam	Gravel	S. & E.	Sound
Araucaria Imbricata	4	do.	do.	do.	do.	Sound. Unripened plants, and those much exposed, of slender constitution, *browned*
Berberis Darwinii	1½	do.	do.	do.	do.	Injured
Do. Dulcis	3	do.	do.	do.	do.	Sound
Do. Aquæfolia	2	do.	do.	do.	do.	Do.
Broom (white)	8	do.	do.	do.	do.	Much injured
Do. (yellow)	3	do.	do.	do.	do.	Killed
Cedrus Deodara	6	do.	do.	do.	do.	Sound (if much exposed, browned)
Do. Robusta	2	do.	do.	do.	do.	Do. do.
Do. Viridis	2	do.	do.	do.	do.	Do. do.
Do. Lebani	4	do.	do.	do.	do.	Do. do.
Do. Atlantica	4	do.	do.	do.	do.	Do. do.
Do. (red)	2	do.	do.	do.	do.	Slightly injured
Cupressus Macrocarpa	10	do.	do.	do.	do.	Sound (if exposed, browned)
Do. do.	2	do.	do.	do.	do.	Killed
Do. Nutkænsis	2	do.	do.	do.	do.	Sound
Do. Corneyana	2	do.	do.	do.	do.	Killed
Do. Lawsonii	2	do.	do.	do.	do.	Sound
Daphne Neapolitana	3	do.	do.	do.	do.	Do.
Do. Collina	3	do.	do.	do.	do.	Do.
Escallonia Macrantha	2	do.	do.	do.	do.	Killed
Fitzroya Patagonica	2	do.	do.	do.	do.	Slightly injured
Gynerium Argentum	Various	do.	do.	do.	do.	Killed
Hollies (var.)	do.	do.	do.	do.	do.	Quite sound
Juniperus (var.)	do.	do.	do.	do.	do.	Do.
Kalmia latifolia	2	do.	do.	do.	do.	Do.
Laurels (Bays)	3	do.	do.	do.	do.	Sound
Do. (Portugals)	3	do.	do.	do.	do.	Do.
Lauristinus	2 to 3	do.	do.	do.	do.	Much injured
Pinus Excelsa	6	10	do.	do.	do.	Sound
Do. Cembra	4	10	do.	do.	do.	Do.
Do. Insignis	3	10	do.	do.	do.	Killed
Do. Nobilis	2	10	do.	do.	do.	Sound
Do. Nordmanniana	4	10	do.	do.	do.	Do.
Do. Pinsapo	1½	10	do.	do.	do.	Slightly injured
Do. Beardsleyi	2	10	do.	do.	do.	Sound
Do. Jeffreyii	2	10	do.	do.	do.	Do.
Do. Tuberculata	2	10	do.	do.	do.	Do.
Do. Sabiniana	4	10	do.	do.	do.	Do.
Abies Douglasi	6	10	do.	do.	do.	Do.
Do. Menziesii	6	10	do.	do.	do.	Do.
Phylleria	Various	10	do.	do.	do.	Killed
Rhododendron Ponticum (var.)	3	10	do.	do.	do.	Sound
Do. (scarlet)	3	10	do.	do.	do.	Slightly injured

No. 56.—Fort Nurseries, Broughty Ferry, *Forfarshire*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Roses	Standards	10	Fine loam	Gravel	S. & E.	Very much injured
Thujopsis Borealis	2	10	do.	do.	do.	Sound
Wellingtonia Gigantea	3	Various	do.	do.	do.	Perfectly sound
No. 57.—Camperdown, *Forfarshire*; above Sea-Level, about 300 feet; Lowest Indication of Ther., 4°; Depth of Snow, 5 or 6 in.						
Araucaria Imbricata	4 to 20	8 to 16	Light loam	Clay	Open	Tops of branches in some cases injured
Abies Douglasi	6 to 24	Various	do.	do.	do.	Perfectly safe
Do. Morinda	16	do.	do.	do.	do.	Do.
Arbutus Unedo	Various	do.	do.	do.	do.	A good deal injured
Cupressus Lawsonii	4 to 6	6 to 8	do.	do.	do.	Perfectly hardy and safe
Do. Lambertiana	12 to 16	12 to 20	do.	do.	do.	Points gone; much injured; sickly
Do. Funebris	Various	Various	do.	do.	do.	Injured a little
Cotoneaster Rigida	do.	do.	do.	do.	do.	Do.
Cedrus Deodara	6 to 24	8 to 30	do.	do.	do.	Quite uninjured
Cephalotaxus Fortunii	Various	Various	do.	do.	do.	Quite safe
Cryptomeria Japonica	25	20	do.	do.	do.	Do.
Escallonia Macrantha	Various	Various	do.	do.	Wall	A good deal injured
Lauristinus	do.	do.	do.	do.	Open	Very much injured
Laurel (Bay)	do.	do.	do.	do.	do.	Do.
Do. (sweet Bay)	do.	do.	do.	do.	do.	Do.
Lonicera	do.	do.	do.	do.	Wall	A good deal injured
Myrtle	do.	do.	do.	do.	do.	Do.
Pinus Excelsa	8 to 26	do.	do.	do.	Open	Quite uninjured
Do. Insignis	8 to 20	do.	do.	do.	do.	Do.
Do. Cembra	Various	do.	do.	do.	do.	Do.
Do. Benthamiana	do.	do.	do.	do.	do.	Do.
Picea Nobilis	do.	do.	do.	do.	do.	Do.
Do. Nordmanniana	8	do.	do.	do.	do.	Do.
Do. Pinsapo	Various	do.	do.	do.	do.	Do.
Do. Pindrow	do.	do.	do.	do.	do.	Do.
Do. Webbiana	do.	do.	do.	do.	do.	Slightly injured
Do. Cephalonica	do.	do.	do.	do.	do.	Quite safe and healthy
Thujopsis Borealis	4 to 6	do.	do.	do.	do.	Do.
Thuja Gigantea	Various	do.	do.	do.	do.	Do.
Taxodium Sempervirens	25	20	do.	do.	do.	Do.
Wellingtonia Gigantea	3 to 9	10	do.	do.	do.	Do.
No. 58.—Dundee, *Forfarshire*; above Sea-Level, 60 feet; Lowest Indication of Thermometer, 4°; Depth of Snow, about a foot.						
Myrtles	6	20	Light loam	Gravel	S.	Killed to the ground
Do.	10	30	do.	do.	do.	Do.
Do.	18 to 20	40 to 50	do.	do.	do.	Do.

In spring, just as the knife was being applied to cut them over, life was observed in the top branches, and a good deal of foliage has come out this year, but they seem still in a sickly state, and rather unhealthy.

No. 59.—Blair Drummond, *Perthshire;* above Sea-Level; about 100 feet; Lowest Indication of Thermometer, —2° on 25th December; Depth of Snow, 6 inches to a foot.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Arbutus Unedo	13	15	Light loam	Sand	E.	Killed to the ground
Araucaria Imbricata	8	10	Mid loam	Red sandstone	S.W.	Leaves a little browned
Do. do.	8	10	Light loam	Sand	N.W.	Top safe; side shoots' points killed
Abies Cœrulea	12	..	Strong loam	Red sandstone	N.	Uninjured
Do. Rubra	8	..	do.	do.	do.	Do.
Do. Douglasi	40	18	Mid loam	do.	S.	Do.
Aucuba Japonica	..	..	Sandy	Sand	do.	Points of shoots killed
Budlea Globosa	..	..	do.	do.	do.	Killed to ground; springing from root
Cupressus Macrocarpa	7	5	Light loam	do.	N.W.	Killed
Do. Goveniana	8	5	do.	do.	E.	Killed (against a wall)
Cephalotaxus Fortunii	4	4	Moss & sand	Gravel	N.	Uninjured
Cryptomeria Japonica	6	5	Light loam	Sand	S.	One uninjured; others points of shoots hurt
Cedrus Deodara	2 to 15	..	Mid loam	Gravel	Open	Uninjured
Do. Libani	5 to 20	..	Moss	Sand	do.	Do.
Laurus Nobilis	4	10	Light loam	do.	E.	Killed to ground
Laurel (common)	Various	Various	do.	do.	Open	Very much injured (cut down)
Do. (Portugal)	do.	do.	do.	do.	do.	Do. do.
Pinus Insignis	4	4	Mid loam	Red sandstone	S.	Killed
Do. Excelsa	10	6	Strong loam	do.	N.	Uninjured
Do. Austriaca	10 to 25	18	do.	do.	do.	Do.
Do. Laricio	16	13	do.	do.	do.	Do.
Do. Cembra	10 to 20	Various	Various	Various	Open	None injured
Picea Cephalonica	15	18	Strong loam	Red sandstone	do.	Uninjured (points slightly injured by *spring* frosts)
Do. Nordmanniana	Various	Various	do.	do.	do.	Uninjured
Spirea Aurifolia	12	15	Sandy	Sand	S.	Killed
Taxodium Sempervirens	4	2	Light loam	do.	do.	Slightly injured
Ilex Europæa	3	15	Sandy	do.	do.	Killed
Do. Florepleno	3	15	do.	do.	do.	Do.
Viburnum Zinus	Various	Various	do.	do.	do.	Killed to ground; springing from roots
Do. Lucidum	do.	do.	do.	do.	do.	Do. do.
Wellingtonia Gigantea	4	2	Mid loam	Red sandstone	N.	None injured

No. 60.—Lanrick Castle, *Perthshire;* above Sea-Level, about 300 feet; Lowest Indication of Ther., 3°; Depth of Snow, 10 inches.

Abies Fraseri	15	10	Light loam	Till	S.W.	Uninjured
Do. Douglasi	4 to 22	6 to 12	do.	do.	do.	Do.
Do. Clanbraziliana	1	12	Do. and peat	Peat and sand	S.	Do.
Araucaria Imbricata	8	10	Strong loam	Till	do.	Points of branches dead, } Growing side by side
Do. do.	8	10	do.	do.	do.	Leaves browned, } Growing side by side
Do. do.	4	5	Light loam	do.	do.	Killed dead
Do. do.	1 to 4	6 to 9	do.	do.	S. & S.W.	All safe
Aucuba Japonica	2	8	Sandy & peat	do.	S.W.	Killed to the ground
Cedrus Deodara	4 to 14	6 to 12	Various	Till and sand	do.	Large plants injured, smaller all safe

No. 60.—LANRICK CASTLE, *Perthshire*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Cedrus Libani	6 to 8	10	Light loam	Gravel	S.W. & N.	Uninjured
Cryptomeria Japonica	9	8	do.	do.	Open	Do.
Do. do.	6	8	do.	Till	S.W.	All young points killed
Juniperus Recurva	4	12	do.	Gravel	S.	Most of branches killed
Do. Virginiana	5 to 10	12	Various	Various	S. & S.W.	None injured
Laurels, common	Large	plants	do.	do.	Open	Killed to the ground
Do. Portugal	do.	do.	do.	do.	do.	Killed to ground, and some dead
Picea Pinsapo	7	10	Strong loam	Gravel	do.	Top and points killed
Do. do.	4	8	Light loam	Sand	S.W.	Uninjured
Do. Cephalonica	15	10	do.	Till	do.	Safe, but in *spring* tips killed by frosts
Pinus Excelsa	7	7	do.	do.	do.	Killed (*dead*)
Do. Cembra	4 to 12	6 to 12	Various	Various	Various	Two killed dead, others safe
Do. Menziesii	5 to 10	6 to 10	Light loam	Till and sand	S.W.	Top and points of branches killed
Do. Austriaca	6 to 15	6 to 12	do.	do.	do.	All safe
Rhododendron Hybrids	1 to 3	1 to 5	Loam & peat	Till	do.	Flower-buds killed; plants safe
Do. Ponticum	1 to 5	4 to 12	do.	Various	Various	Flower-buds dead; leaves browned
Taxodium Sempervirens	16	12	Light loam	Till	S.W.	Uninjured

No. 61.—TAYMOUTH, *Perthshire*; above Sea-Level, 370 feet; Lowest Indication of Thermometer, 6°.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	18	20	Light	Gravel	South	Untouched by frost
Abies Douglasi	40	21	do.	do.	do.	Do.
Do. Morinda	12	16	do.	do.	do.	Do.
Aucuba Japonica	Various	Various	do.	do.	do.	Do.
Arbutus Unedo	do.	do.	do.	do.	do	Do.
Apricot	do.	do.	do.	do.	do.	Do.
Cedrus Deodara	25	21	do.	do.	do.	Do.
Do. Atlantica	6	8	do.	do.	do.	Do.
Cupressus Lambertiana	18	16	do.	do.	do.	Do.
Cryptomeria Lobbii	12	12	do.	do.	do.	Do.
Cephalotaxus Fortunii	3	7	do.	do.	do.	Do.
Erica Mediterranea	Various	Various	do.	do.	do.	Do.
Garrya Elliptica	do.	do.	do.	do.	do.	Do.
Hollies	do.	do.	do.	do.	do.	Do.
Juniperus (var.)	do.	do.	do.	do.	do.	Do.
Fitzroya Patagonica	4	6	do.	do.	do.	Do.
Laurel, Portugal	Various	Various	do.	do.	do.	Do.
Magnolia (var.)	do.	do.	do.	do.	do.	Do.
Mistletoe	do.	do.	do.	do.	do.	Do.
Picea Nobilis	12	14	do.	do.	do.	Do.
Do. Pichta	25	20	do.	do.	do.	Do.
Do. Webbiana	8	8	do.	do.	do.	Do.
Pinus Insignis	Various	Various	do.	do.	do.	Do.
Rhododendrons (var.)	do.	do.	do.	do.	do.	Do.
Saxe-Gothæa	3	5	do.	do.	do.	Do.

No. 61.—Taymouth, *Perthshire*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Saxe-Gothæa Conspicua	3	5	Light	Gravel	S.	Untouched by frost
Thuja (var.)	Various	Various	do.	do.	do.	Do.
Wellingtonia Gigantea	do.	do.	do.	do.	do.	Do.

The only loss sustained has been some varieties of Chinese roses.—Upon the whole, there have been far greater losses in ordinary winters.

No. 62.—Ochtertyre, *Perthshire;* above Sea-Level, 366 feet; Lowest Indication of Thermometer, 12°; Depth of Snow, 5 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Abies Morinda	14	20	Light loam	Very strong clay	S.	Quite hardy
Do.	15	20	do.	do.	S.E.	Do.
Do. Douglasi	10	6	do.	do.	S.W.	Do. shoots about 18 inches annually)
Do. Menziesii	7	6	do.	do.	do.	Do.
Cupressus Lambertiana	2	4	Rich loam	..	S.	Do.
Escallonia Macrantha	2	3	Stiff clay	..	E.	Hardy
Picea Nobilis	4	8	Sandy clay	..	S.	Do.
Skimmia Japonica	1	3	Garden soil	..	do.	Flowering at present well
Rhododendron (var.)	Various	Various	..	..	..	Hybrids browned on foliage, and a few buds destroyed

No. 63.—Pitfour, *Perthshire;* above Sea-Level, about 75 feet; Lowest Indication of Ther., 3°; Depth of Snow, about 12 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Aucuba Japonica	5	..	Clay	Very stiff clay	Various	Killed to the ground
Arbutus Unedo	3 to 10	..	Clay & loam	Very stiff clay & till	On walls and open borders	Killed to ground
Araucaria Imbricata	10	..	Clay	Sand	S.	Side-shoots killed; leader safe
Budlea Globosa	..	..	Loam	Clay	Sheltered	Killed to the ground
Amygdalus Incana	2	4	do.	do.	Wall S.	Do. do.
Sweet Bay (Laurel)	..	..	do.	Clay and till	S.	Killed, root and branch
Bay (Common)	20	10 to 40	do.	do.	Various	Very much cut up
Ceonothus Thyrsiflorus	10	..	Stiff clay	do.	E. (wall)	Killed to the ground
Erica Mediterranea	..	..	Loam	Clay	Various	Do. do.
Do. Stricta	..	..	do.	do.	do.	Do. do.
Do. Multiflora	..	..	do.	do.	do.	Do. do.
Lauristinus	10	..	Stiff clay	Clay and till	E.	Do. do.
Do.	3 to 8	..	Clay loam	do.	Various	Do. do.
Pinus Insignis	8	12	Sand & loam	Sand	E.	Do. do.
Roses, China / Do. Tea-Scented	..	..	..	..	..	In various situations, on walls and borders killed generally.
Cedrus Deodara	Various	Various	Various	Various	E.N.E.	Much browned; now budding
Cork tree	8	..	Light loam	Sand	Open	All but killed
Cupressus Sempervirens	36	45	Clay	do.	Sheltered	Points of shoots killed
Cercis Siliquastrum	10	40	do.	Clay	S.	All the young wood killed
Taxodium Sempervirens	10	12	Sandy loam	Sand	E.	Lost last year's wood

No. 64.—CULROSS ABBEY, *Perth*; above Sea-Level, 70 feet; Lowest Indication of Thermometer, 2°; Depth of Snow, about 6 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Arbutus Unedo	Old plants		Wet, and impregnated with iron		S.	Much injured
Cedrus Lebani	Perhaps 200 years old (3 trees)		do.		do.	Little injured
Ficus Carica (Fig-tree)	Old trees		do.		do.	Much injured
Oriental Planes	Three *large* trees		do.		do.	Not injured
Nos. 65 & 66.—DUNIMARLE, *Perthshire*, above Sea-Level, only a few feet; and VALLEYFIELD, *Perthshire* (near Forth), above Sea-Level, 70 feet. Lowest Indication of Thermometer, 2°; Depth of Snow, about 6 inches.						
Araucaria Imbricata	4	7	Wet, & impregnated with iron	Wet, & impregnated with iron	S.E.	A little browned in points
Abies Morinda	23 to 25	..	do.	do.	do.	But slightly injured
Aucuba Japonica	..	..	do.	do.	do.	Severely injured; leaves dropped off, but reappearing
Cedrus Deodara	20	25 to 30	do.	do.	do.	Very slightly injured
Cupressus Lusitanica	15	..	do.	do.	do.	All dead
Pines from Affghanistan	15	..	do.	do.	do.	Uninjured
Rhododendron, Hybrid	Old plants	Old plants	do.	do.	do.	All dead
Rhododendrons, Common	do.	do.	do.	do.	do.	Uninjured
The above only a few yards from the shore.						
The following about 70 to 80 feet above sea-level:—						
Sweet Bay	Old plants	Old plants	Wet, & impregnated, with iron	Wet, & impregnated with iron	S.E.	Dead to root; now sprouting
Common Laurel	do.	do.	do.	do.	do.	Much injured
Cratægus Plana	do.	do.	do.	do.	do.	Dead
Portugal Laurel	do.	do.	do.	do.	do.	Much injured
Jasminum Revolutum	do.	do.	do.	do.	do.	Dead
Do. Album	do.	do.	do.	do.	do.	Do.
Lonicera Cœrulea	do.	do.	do.	do.	do.	Do.
Ilex (Hollies)	do.	do.	do.	do.	do.	Uninjured
Rhododendrons, Hybrid	do.	do.	do.	do.	do.	But partially injured
Roses, Hybrid and Chinese	do.	do.	do.	do.	do.	Dead to snow-line
Do. Dutch	do.	do.	do.	do.	do.	Much injured
Do. French	do.	do.	do.	do.	do.	Dead
Almost every plant of Lauristinus in the district *dead* to root.						
No. 67.—KEIR, *Perthshire*; above Sea-Level, 400 feet; Lowest Indication of Ther., —2°; Depth of Snow, 2 to 3 inches.						
Araucaria Imbricata	28	25	Deep loam	S. till	S.	Uninjured; sheltered around by shrubs
Do. do.	6	10	S. loam	Rock	do.	Points of shoots injured, but *not* destroyed
Do. do.	1	3	do.	Till	do.	Injured, and many destroyed
Abies Douglasi	30	20	Deep loam	do.	do.	Uninjured

No. 67.—Keir, *Perthshire*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Abies Morinda	10	10	Deep loam	Till	S.	Uninjured
Do. Menziesii	10	10	do.	do.	do.	Do.
Do. Clanbrasiliana	2	10	do.	do.	do.	Do.
Aucuba Japonica	8	..	Tilly loam	do.	N.E.	Tops of shoots destroyed
Cedrus Deodara	15	15	Deep loam	do.	S.E.	Two plants only destroyed out of several hundreds
Cupressus Torulosa	15	15	do.	Rock	do.	Much injured; several killed
Do. Lambertiana	3	3	S. till.	Till	S.W.	Sixty per cent killed
Do. do.	20	15	S. loam	Rock	S.E.	Uninjured (soil poor and thin)
Cryptomeria Japonica	15	15	do.	do.	S.	Uninjured
Lauristinus	6	20	do.	Till	S.W.	Several quite killed; others cut back
Pinus Insignis	20	15	do.	Rock	S.	Killed
Do. do.	30	20	do.	Till	do.	Slightly hurt
Do. Macrocarpa	20	15	Deep loam	do.	do.	Uninjured
Picea Nobilis	15	15	do.	Rock	do.	Do.
Do. Nordmanniana	3	10	do.	Till	do.	Do.
Do. Pindrow	6	10	do.	Rock	do.	Tips of shoots all destroyed
Do. Pinsapo	6	10	do.	Till	do.	Uninjured
Do. Webbiana	15	10	do.	do.	do.	Tops destroyed, and buds of leading shoots
Taxodium Sempervirens	12	15	Sandy	Rock	S.E.	Uninjured
Roses	..	..	..	..	..	Many have been killed in various aspects
Portugal Laurels	..	..	..	..	..	Dropping their leaves when pruning
Bay Laurels	..	..	..	..	..	Killed where much shaded by trees

No. 68.—Tulliallan Castle, *Perthshire* (near the Forth); above Sea-Level, 50 feet; Lowest Indication of Thermometer, 2° on 24th December; Depth of Snow, 14 inches or thereby.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Aucuba Japonica	4	..	Dark sandy loam	Gravel and red earth	N.E.	Suffered much; cut back
Arbutus Unedo	8	..	do.	do.	W.	Killed completely
Araucaria Imbricata	9	10	do.	do.	E.	Slightly injured
Ceanothus Divaricatus	6	..	do.	do.	S.	Quite dead
Erica Arborea	4	..	do.	do.	S.W.	Killed to the ground
Gum Cistus	4	..	do.	do.	Various	Quite dead
Lauristinus	3	..	do.	do.	E.	Killed to the ground
Laurus Nobilis (Sweet Bay)	4	..	do.	do.	do.	Quite dead
Leycesteria Japonica	5	..	do.	do.	W.	Do.
Photinia Serrulata	12	20	do.	do.	S.E.	Suffered much; cut back
Rhododendron Hybrid	Various	Various	do.	do.	Various	All killed to the ground
Roses, standards and dwarfs	do.	do.	do.	do.	do.	Nearly all killed; some cut back to the last eye, and breaking

No. 69.—DUNKELD HOUSE, *Perthshire*; above Sea-Level, about 180 feet; Lowest Indication of Ther., 4°; Depth of Snow, about 1 foot.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Araucaria Imbricata	15	14	Light loam	Gravel	S.	Very slightly browned
Arborvitæ (Chinese)	14	12	do.	do.	do.	Slightly browned
Aucuba Japonica	6	Old	Peat	do.	do.	Nearly dead; cut in, and buds breaking
Arbutus Unedo	8	do.	Light loam	do.	do.	Partly dead; cut down, and springing
Cedrus Deodara	12	9	do.	do.	do.	Very slightly browned
Cupressus Goveniana	4	9	do.	do.	E.	Killed to ground
Do. Lambertiana	4	9	do.	do.	W.	Do. do.
Do. Funebris	5	9	do.	do.	S.	Do. do.
Cryptomeria Japonica	6	9	do.	do.	do.	Do. do.
Lauristinus	6	9	do.	do.	do.	Do. do.
Laurel (Common)	20	Old	do.	do.	Open	Branches dead, but not to great extent
Do. (Portugal)	20	do.	do.	do.	do.	Do. do.
Pinus Douglasi	20	16	do.	do.	E.	Not touched
Ribes Sanguineum	6	16	do.	do.	S.	Some killed, others uninjured
Rhododendrons (var.)	16	16	Peat, loam, & sand	do.	All	Not in the least affected

No. 70.—KILMORY, *Argyle*; above Sea-Level, 200 feet; Lowest Indication of Thermometer, 11°; no Snow.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	11	20	Peat	Rock	Sheltered	Not in the least affected
Do. Cunninghami	11	20	do.	do.	In wood	Do. do.
Aristolochia Sempervirens	9	15	Loam	Clay	S.E.	Dead to the ground, but now growing fresh again
Aucuba Japonica	5	20	Various	Various	..	Not hurt in any situation
Azalea Indica Odorata	2	20	Peat	Peat	N.E.	Not hurt; flowered this summer
Do. Amana	1	2	do.	do.	S.E.	Not hurt
Benthamia Fragifera	12	20	Loam	Clay	E.	Very little hurt
Budlea Lindleyana	12	16	Dry loam	Dry loam	S.W.	Hurt, but not dead
Do. Globosa	12	16	do.	do.	do.	Stems not hurt
Bamboo Arundinacea	12	12	Clay	Clay	do.	Injured a little, but growing again
Ceanothus Azureus	8	16	Loam	Rock	do.	Not injured
Cryptomeria Japonica	15	12	Clay	Clay	W.	Not a leaf hurt
Clianthus Punicens	8	6	Dry loam	Dry loam	S.W.	Dead
Camelia (single)	8	20	Peat	Gravel	S.E.	Not hurt
Ceanothus Divaricatus	4	4	Clay	Clay	do.	Dead to the ground, but growing again
Clethra Alnifolia	4	20	Peat & clay	Peat and clay	do.	Not the least hurt in any situation
Cedrus Deodara	15	19	Dry	Gravel	W.	Have not suffered in the least
Escallonia Rubra	10	16	Garden mould	Rock	S.W. wall	Not hurt
Do. Macrantha	10	16	do.	do.	S.W.	On open border, and not hurt
Epigæa Repens	1	5	Peat & clay	Loam	N.	Uninjured
Eugenia Ugni	1	5	Sandy	Sand	W.	Do.
Erica Arborea	3	20	Peat	Peat	S.	Dead, or nearly so
Euonymus Japonicus	7	20	Various	Various	Various	Dead to the ground
Gunnera Scabra	3	..	Peat	Clay	S.	Not injured
Garrya Elliptica	7	16	do.	Peat	do.	Uninjured

No. 70.—KILMORY, *Argyle*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Genista	8	20	Loam	Clay	S.E.	Not hurt
Ilex Latifolia	6	12	Peat	do.	S.W.	Have not suffered
Jasminum Nudiflorum	6	6	Dry	Dry	do.	Unhurt, and flowered well this year
Ligustrum Lucidum	18	20	Loam	Clay	S.E.	Unhurt on wall, but injured on border
Lauristinus	6	20	do.	Do.	Various	Very slightly injured; unhurt on hill
Laurus Nobilis or Laurels (Bay)	6	20	do.	Do.	do.	Uninjured
Laurel (Portugals)	6	20	do.	Do.	do.	Very little injured; unhurt on hill
Lophosperma Hendersonii	12	20	Dry loam	Do.	S.	Dead to the ground, but sprouting
Leycesteria Japonica	10	16	Clay	Do.	S.E.	Dead
Do. Formosa	10	16	do.	Do.	do.	Unhurt, and growing well
Mitraria Coccinea	1	10	Peat	Peat	E.	Very little injured
Myrtles	3	16	do.	Gravel	S.E.	Dead to the ground
Magnolia Grandiflora	12	20	Dry	Dry	S.E. & W.	Unhurt, but have not flowered this year
Olea Illicifolia	2	..	Peat	Clay	S.	Not hurt
Photinia Serrulata	12	20	Loam	do.	S.E.	Injured much, but springing fast now
Passiflora Cœrulea	14	20	do.	do.	E.	Dead
Pampas Grass, or Gonerium Argenteum	..	5	Dry loam	do.	S.	Injured, but not dead
Phormium Lenax	..	2	Wet clay	Wet clay	E.	Dead to the ground
Piptanthus Nepalensis	12	16	Clay	Clay	do.	Not hurt
Pistacia Lentiscus	2	12	Dry	Rock	S.	Dead
Phlomis Fruticosa	..	20	Loam	Loam	..	Dead to the ground, but sprouting
Rhododendron Faulkneri	5	18	Peat	Peat	W.	Have not suffered
Do. Arboreum Cinnamomeum	5	18	do.	do.	do.	Do.
Do. Ciliatum	5	18	do.	do.	do.	Do.
Do. Glaucum	5	18	do.	do.	do.	Do.
Do. Edgeworthi	5	18	do.	do.	do.	Dead
Veronica Lindleyana	..	..	..	..	..	Uninjured
Do. Hendersonii	3	20	Dry sandy	Clay	S.W.	Dead
Do. Decussata	3	20	do.	do.	do.	Do.
Do. Speciosa	3	20	do.	do.	do.	Do.
Weigelia Rosea	4	8	Clay	do.	do.	Unhurt; flowered very well
Do. Amabilis	4	8	do.	do.	do.	Do. do.
Woodwardia Radicum	..	..	do.	do.	..	Out with little protection, and growing well
Fuchsias and Roses	..	..	..	..	..	Are a little injured, but not killed
Paulownia Imperialis	..	..	..	..	..	Dead, but root appears fresh and likely to spring

No. 71.—ARDCHATTAN PRIORY, *Argyleshire*; above Sea-Level, 10 feet; Lowest Indication of Ther., 9°; Depth of Snow, 1 inch.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	10	10	Light gravelly	Sand and gravel	S.	No injury sustained
Alaternus Rhamnus	6	10	do.	do.	do.	Foliage dropped off
Arbutus Unedo	5	12	do.	do.	do.	Uninjured
Arborvitæ (Chinese)	6	8	do.	do.	do.	Slightly browned
Hydrangea	5	30	do.	do.	do.	Lost flower-buds

No. 71.—Ardchattan Priory, *Argyleshire*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Ilex (var.)	10 to 15	14 to 50	Light gravelly	Sand & Gravel	S.	Uninjured
Ligustrum Lucidum	6	9	do.	do.	do.	Leaves lost, and points of branches gone
Laurel (Portugal)	10	14	do.	do.	do.	Lost their leaves
Laurels (Common)	8	14	do.	do.	do.	Do.
Lauristinus	7	12	do.	do.	do.	Do.
Laurel (Sweet Bay)	10	12	do.	do.	do.	No injury
Phillyræa (var.)	4	12	do.	do.	do.	Lost leaves and points of shoots
Taxus Baccata-Fastigiata	10	14	do.	do.	do.	Very luxuriant
Roses	Various	Various	do.	do.	do.	A number killed and others much injured

The loss of leaves above mentioned is rather the effects of a very severe gale of wind in October last, than of the winter's frost. In sheltered places, the effects were pretty much the same as in any ordinary winter.

Average depth of snow in 1859-60 was 4 inches. This last winter, 1860-61, only 1 inch.

No. 72.—Islay House, *Argyleshire* (Island of Islay); above Sea-Level, 40 ft.; Lowest Indication of Ther., 7°; No Snow.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	1 to 2	4	Gravel	Gravel	Open	Quite hardy
Cedrus Deodara	3	4	do.	do.	do.	Do.

No damage apparently done to any of the trees or shrubs in the district.

No. 73.—Durris, *Kincardineshire*; above Sea-Level, 300 feet; Lowest Indication of Ther., about 5°; Depth of Snow, 14 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Abies Menziesii	Various	Various	Mossy	Cold clay	N.	Stood well; uninjured
Do. Taxifolia	do.	do.	do.	do.	do.	Do. do.
Do. Pattonii	do.	do.	do.	do.	do.	Do. do.
Do. Monstrosa	do.	do.	do.	do.	do.	Do. do.
Do. Orientalis	do.	do.	do.	do.	do.	Do. do.
Cedrus Atlantica	do.	do.	do.	do.	do.	Do. do.
Do. Deodara	do.	do.	do.	do.	do.	Do. do.
Cryptomeria Japonica	do.	do.	do.	do.	do.	Do. do.
Do. Lobbii	do.	do.	do.	do.	do.	Do. do.
Do. Nana	do.	do.	do.	do.	do.	Do. do.
Chamæcyparus Sphæroidea	do.	do.	do.	do.	do.	Do. do.
Do. Glauca	do.	do.	do.	do.	do.	Do. do.
Do. Ericoides	do.	do.	do.	do.	do.	Do. do.
Do. Squarrosa	do.	do.	do.	do.	do.	Do. do.
Cupressus Lawsonii	do.	do.	do.	do.	do.	Do. do.
Do. Torulosa	1½ to 5	do.	do.	do.	do.	Do. do.
Do. Macrocarpa	Various	do.	do.	do.	do.	Do. do.
Pinus Benthamiana	do.	do.	do.	do.	do.	Do. do.
Do. Jeffreyii	do.	do.	do.	do.	do.	Do. do.
Do. Monticola	do.	do.	do.	do.	do.	Do. do.
Do. Lambertiana	do.	do.	do.	do.	do.	Do. do

No. 73.—Durris, *Kincardineshire*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Pinus Parviflora	Various	Various	Mossy	Cold clay	N.	Stood well; uninjured
Do. M'Intoshiana	do.	do.	do.	do.	do.	Do. do.
Picea Nobilis	34	do.	do.	do.	do.	Do. do.
Do. Amabilis	Various	do.	do.	do.	do.	Do. do.
Do. Grandis	do.	do.	do.	do.	do.	Do. do.
Do. Bracteata	do.	do.	do.	do.	do.	Do. do.
Do. Nordmanniana	do.	do.	do.	do.	do.	Do. do.
Do. Webbiana	do.	do.	do.	do.	do.	Do. do.
Do. Pindrow	do.	do.	do.	do.	do.	Do. do.
Do. Pinsapo	do.	do.	do.	do.	do.	Do. do.
Do. Pichta	do.	do.	do.	do.	do.	Do. do.
Do. Sibirica	do.	do.	do.	do.	do.	Do. do.
Quercus Ilex	1 to 5	do.	do.	do.	do.	Very much injured; as much, perhaps, by the frost on 12th and 13th May as during winter
Thujopsis Dolabrata	Various	do.	do.	do.	do.	Stood the winter well
Thuja Gigantea	do.	do.	do.	do.	do.	Do.
Do. Glauca	do.	do.	do.	do.	do.	Do.
Torreya Myristica	do.	do.	do.	do.	do.	Do.
Do. Taxifolia	do.	do.	do.	do.	do.	Do.
Do. Nuciflora	do.	do.	do.	do.	do.	Do.
Wellingtonia Gigantea	do.	do.	do.	do.	do.	Do.
Araucaria Imbricata	do.	do.	do.	do.	do.	A few injured in points
Hollies (various)	do.	do.	do.	do.	do.	Quite healthy

No. 74.—Gordon Castle, *Banffshire* (Portion of); above Sea-Level, 70 feet; Lowest Indication of Thermometer, 10° on 25th Dec.; Depth of Snow, 12 to 14 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	9	14	Loam & Bog earth	Gravel	Open	Uninjured
Cedrus Deodara	16	14	Sandy loam	do.	do.	Quite healthy
Cryptomeria Japonica	8	7	Red loam	Clay	do.	Perfectly hardy
Cedrus Libani	30	40	Black loam	do.	Sheltered	Uninjured
Liriodendron Tulipifera	20	30	do.	Gravel	Open	Top shoots injured
Laurels (common)	Various	Various	Various	Various	Various	Quite unscathed
Do. (Portugal)	do.	do.	do.	do.	do.	Do.
Do. (Bay)	do.	do.	do.	do.	do.	Do.
Do. (Sweet Bay)	do.	do.	do.	do.	do.	Do.
Magnolia Grandiflora	12	35	Black loam	Clay	S. wall	Foliage lost, but recovering
Do. Fuscata	14	35	do.	do.	do.	Quite safe (uninjured)
Pinus Excelsa	10	12	do.	do.	Open	Perfectly hardy
Do. Strobus	40	80	do.	do.	do.	Do.
Do. Laricio	5	7	do.	do.	do.	Do.
Do. Austriaca	2	5	do.	do.	do.	Do.
Do. Cembroides	2	5	do.	do.	do.	Do.

No. 74.—Gordon Castle, *Banffshire* (Portion)—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Pinus Khutrow	10	12	Black Loam	Clay	Open	Perfectly hardy
Do. Pallasiana	2	5	do.	do.	do.	Do.
Picea Webbiana	3	6	do.	do.	do.	Do.
Abies Douglasi	2	4	do.	do.	do.	Do.
Rhododendron (var.)	Various	Various	do.	do.	do.	Do.
Pinus Pumilio	3	5	do.	do.	do.	Do.
Standard and Climbing Roses have all suffered severely (killed to *snow*)						
No. 74*a*.—Gordon Castle, *Morayshire* (Portion of); above Sea-Level, 70 to 80 feet; Lowest Indication of Thermometer, 10° on 25th Dec.; Depth of Snow, 7 inches.						
Araucaria Imbricata	8	14	Loam & bog earth	Sandy clay	Open	Not injured in the least
Do. do.	2 to 5	Young	do.	do.	do.	Quite healthy
Cedrus Deodara	14	14	Light loam	do.	do.	Not injured at all
Do. do.	..	Young	do.	do.	do.	Do.
Cryptomeria Japonica	8	8	Heavy red loam	Red sandstone	do.	Slightly browned on young wood
Cupressus Funebris	..	Young	Light loam	Gravel	do.	Safe
Do. Lambertiana	..	do.	do.	do.	do.	Do.
Do. Seinpervirens	..	do.	do.	do.	do.	Very much browned; some dead
Laurels (Portugals)	25	50 to 60	Light soil	Gravel and clay	Sheltered	Slightly browned where exposed
Figs	12	..	do.	do.	S. wall	Young wood killed, although covered with straw
Magnolia Grandiflora	12	40	do.	do.	do.	Lost nearly all its leaves
Do. Fuscata	14	40	do.	do.	do.	Flowerbuds dropped off; uninjured otherwise
Phillyræa (var.)	6 to 15	4 to 30	Black loam	Gravel	Sheltered	Lost all leaves; some of young wood dead
Quercus Ilex	6 to 15	4 to 30	do.	do.	do.	Do. do.
Pinus Excelsa	10	12	do.	do.	Open	Uninjured
Do. Douglasi	Young	Young	do	do.	do.	Do.
Picea Webbiana	do.	do.	do.	do.	do.	Do.
Do. Nobilis	do.	do.	do.	do.	do.	Do.
Pinus Cembroides	do.	do.	do.	do.	do.	Do.
Abies Morinda	9	12	Light loam	do.	do.	Do.
Pinus Pallasiana	Young	Young	do.	do.	do.	Do.
Do. Jeffreyii	do.	do.	do.	do.	do.	Do.
Thuja Orientalis	do.	do.	do.	do.	do.	Do.
Do. Glauca	do.	do.	do.	do.	do.	Do.
Roses (var.)	Various	Various	do.	do.	S.	Nearly all killed, unless *well* sheltered
Wellingtonia Gigantea	Young	Young	do.	Sandy Clay	Open	Uninjured
No. 75.—Aberlour House, *Banffshire*; above Sea-Level, about 300 feet.						
Azalea Indica	3	..	Light sandy loam	Gravel	Various	In sheltered situations little hurt; where exposed, *killed*
Arbutus Unedo	8	..	do.	do.	do.	Killed to the ground

No. 75.—Aberlour House, *Banffshire*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Araucaria Imbricata	7	..	Light sandy loam	Gravel	Various	Unhurt—(lately transplanted)
Arbor Vitæ (var.)	Various	..	do.	do.	do.	Quite hardy
Aucuba Japonica	do.	..	do.	do.	do.	Killed
Cupressus (var.)	5	..	do.	do.	do.	Quite hardy
Cedrus Deodara	Various	..	do.	do.	do.	Do.
Coronaria Philadelphica	4	..	do.	do.	do.	Do.
Deutzia Scabra	2	..	do.	do.	do.	Uninjured
Do. Gracilis	2	..	do.	do.	do.	Do.
Jasminum Officinale	Various	..	do.	do.	On walls	Killed
Kalmia Angustifolia	2	..	do.	do.	Various	Do.
Laurel (Portugal)	Various	..	do.	do.	do.	Young wood killed back one year
Do. (Bay)	do.	..	do.	do.	do.	Do. do.
Do. (Sweet Bay)	4	..	do.	do.	do.	Killed
Lauristinus	Various	..	do.	do.	do.	Do.
Ligustrum Japonicum	do.	..	do.	do.	do.	Young wood all killed
Leycestéria Formosa	do.	..	do.	do.	do.	Killed in exposed situations
Rhododendrons	3 to 5	..	do.	do.	do.	Killed to ground in open situations
Do.	3 to 5	..	do.	do.	do.	Under trees not much hurt
Peach Trees	Various	..	do.	do.	On walls	Killed
Weigelia rosea	4	..	do.	do.	Various	Hardy. (*Not* flowered this season)
Wellingtonea Gigantea	3	..	do.	do.	do.	Perfectly hardy and uninjured. Made 15 inches young wood

No. 76.—Ballindalloch, *Banff*, and Upper Part of *Morayshire*; above Sea-Level, 400 feet; Lowest Indication of Thermometer, —11°; Depth of Snow, about 15 inches (and much drifted).

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Scotch Firs	Various heights, 30 to 90 feet.	Various, 20 to 150 years.	Loam	Gravelly. Where clay the trees do not thrive	Open and various, chiefly S. and S.W.	Uninjured by frost
Natural Firs			do.			Do.
Spruce do.			do.			Do.
Silver do.			do.			Do.
Larch do.			do.			Do.
Cedrus Deodara			do.			Injured considerably
Abies Douglasi			do.			Uninjured
Do. Menziesii			do.			Do.
Oak Trees			do.	Open	Various	No damage from frost
Ash do.			do.	do.	do.	Do.
Elm do.			do.	do.	do.	Do.
Beech do.			do.	do.	do.	Do.
Plane do.			do.	do.	do.	Do.
Roses (var.)	Various	Various	do.	Gravelly	S. and W.	One-half destroyed totally
Portugal Laurels	do.	do.	do.	do.	do.	All young shoots destroyed
Rhododendrons	do.	do.	do.	do.	do.	Perfectly safe

No. 76.—BALLINDALLOCH, *Banff*, and Upper Part of *Morayshire*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Box Tree	Various	Various	Loam	Gravelly	S. and W.	Perfectly safe
Snowberry	do.	do.	do.	do.	do.	Do.
Yews	do.	do.	do.	do.	do.	Do.
Cedars (red and white)	do.	do.	do.	do.	do.	Do.

No. 77.—PINEFIELD NURSERY (Elgin), *Morayshire*; above Sea-Level, 35 feet; Lowest Indication of Thermometer, 16° on 24th Dec.; Depth of Snow, 20 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Arbutus Unedo	3	10	Sandy loam	Sand	Open	Cut down to ground, but alive
Aucuba Japonica	3	10	do	do.	do.	Do. do.
Abies Brunoniana	3	10	do.	do.	do.	Killed
Araucaria Imbricata	3	10	do.	do.	do.	Browned in many cases, but in no instance *killed*; some quite green
Budlea Globosa	10	20	do.	do.	do.	Killed. In some cases springing from root
Biota Orientalis	2	7	do.	do.	do.	Some branches killed
Do. Meldensis	2	5	do.	do.	do.	Do.
Cercis Siliquastrum	1 to 2	5	do.	do.	do.	Cut down to ground, but alive
Ceanothus Azureus	2	3	do.	do.	S. wall	Killed
Do. Dentatus	2	3	do.	do.	do.	Do.
Cistus Formosus	2 to 3	5	do.	do.	Open	Killed to snow line
Do. Lusitanicus,	2 to 3	5	do.	do.	do.	Do.
Cedrus Deodara	3 to 6	10 to 15	do.	do.	do.	Young shoots browned; recovering
Do. Argentea	3 to 6	10 to 15	do.	do.	do.	Do. do. do.
Cupressus Funebris	3	10	do.	do.	do.	Injured a little on young wood
Do. Goveniana	3	10	do.	do.	do.	Do. do.
Do. Lambertiana	3	10	do.	do.	do.	Do. do.
Daphne (Hybrids)	2	5	do.	do.	do.	Killed to snow-line
Escallonia Macrantha,	2	5	do.	do.	do.	Do.
Garrya Elliptica	3	10	do.	do.	do.	Browned, but alive
Ilex Aquifolium (var.)	3	10	do.	do.	do.	Foliage lost; young wood killed
Laurus Nobilis	2	5	do.	do.	do.	Killed to ground
Do. Regalis	2	5	do.	do.	do.	Killed
Lauristinus (var.)	3	10	do.	do.	do.	Killed to ground and snow-line
Ligustrum Lucidum	2	5	do.	do.	do.	Do. do.
Do. Japonicum	2	5	do.	do.	do.	Do. do.
Mitraria Coccinea	1	5	do.	do.	do.	Do. do.
Phillyræa (var.)	3	10	do.	do.	do.	Injured a good deal
Pinus Insignis	3	7	do.	do.	do.	Killed to snow-line; some *entirely*
Do. Radiata	3	7	do.	do.	do.	Do. do.
Pines of other sorts	Various	Various	do.	do.	do.	Stood well
Rosemary	3	10	do.	do.	do.	Killed to ground
Veronica Andersoni	3	10	do.	do.	do.	Do.
Peaches, Apricots, and Nectarines on a paling, killed; on a wall, uninjured						

No. 78.—Muirtown Nursery (Inverness), *Inverness-shire;* above Sea-Level, 40 feet; Depth of Snow, 9 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Araucaria Imbricata	1 to 4	6 to 10	Dark loam	Sandy clay	S.	Mostly killed to snow-line
Arborvitæ (Chinese)	2	5	do.	do.	do.	Killed to the ground
Arbutus Unedo	2 to 10	4 to 10	do.	do.	do.	Do.
Aucuba Japonica	3	5	do.	do.	S.E.	Young shoots killed to snow-line
Cedrus Deodara	6	10	do.	do.	S.	Young shoots very much hurt
Cryptomeria Japonica	8	4	do.	do.	do.	Killed to the ground
Cupressus Sempervirens	3	4	do.	do.	S.E.	Entirely killed
Do. Funebris	4	6	do.	do.	do.	Do.
Do. Lambertiana	6	8	do.	do.	do.	Do.
Do. Torulosa	8	5	do.	do.	do.	Do.
Cratægus Crenata	2	3	do.	do.	do.	Killed to snow-line
Eleagnus Reflexus	5	8	do.	do.	S.	Killed to the ground
Escallonia Rubra	6	10	do.	do.	S.E.	Do.
Do. Macrantha	4	5	do.	do.	S.W.	Do.
Euonymus Japonicus	2	3	do.	do.	S.	Killed
Gum Cistus	6	10	do.	do.	W.	Do.
Laurel (Bay)	3	5	do.	do.	S.	Young shoots of last year destroyed
Do. (Sweet Bay)	2	4	do.	do.	S.W.	Young plants killed, older much hurt
Lauristinus	2	4	do.	do.	do.	Killed to the ground
Lavender	Young	Young	do.	do.	S.	Killed
Cupressus Lawsonii	Various	Various	do.	do.	Various	Stood well
Phillyræa (var.)	4	8	do.	do.	S.E.	All varieties much hurt
Rhamnus Alaternus	3	5	do.	do.	N.E.	Almost killed
Rhododendron (Hybrid)	5	10	do.	do.	N.W.	Much injured; some killed to ground
Roses	Various	Various	do.	do.	..	Almost all totally killed
Taxodium Sempervirens	6	8	do.	do.	S.E.	Killed to snow level
Wellingtonia Gigantea	Young	Young	do.	do.	do.	Stood well. Quite hardy
Thujopsis Borealis	do.	do.	do.	do.	do.	Do. do.
Peaches and Nectarines trained to wood, killed; young wood on old-established trees, killed						
Quercus Ilex is also very much destroyed in low-lying situations						
Common Oak in many places lost last year's growth of wood						

No. 79.—Dunrobin, *Sutherland;* above Sea-Level, 6 feet; Lowest Indication of Thermometer, 16°; Depth of Snow, 14 inches.

Aucuba Japonica	2 to 6	4 to 8	Dark sandy loam	Pure sand	S.	Small plants killed, large injured
Araucaria Imbricata	3 to 20	Various	do.	Hard	N.W.	Uninjured
Budlea Globosa	8 to 10	do.	do.	Sand	S.	Do.
Cryptomeria Japonica	10	7	do.	do.	do.	Much injured; last year's growth gone
Cedrus Deodara	3 to 16	Various	do.	Hard	S.W.	Uninjured
Do. Atlantica	8	do.	do.	Sand	do.	Do.
Escallonia Macrantha	4 to 6	do.	do.	do.	S. wall	Do.
Lauristinus	4 to 6	4 to 8	do.	do.	S.	Some killed to ground; all more or less hurt

No. 79.—DUNROBIN, *Sutherland*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Laurel (Portugal)	2 to 12	4 to 10	Loam	Sand	S.W.	A good deal injured
Do. (common)	2 to 12	4 to 10	do.	do.	do.	Last year's shoots killed back
Do. (Sweet Bay)	8	20	do.	do.	do.	Uninjured
Wellingtonia Gigantea	3	4	do.	do.	do.	Do.

Portugal Laurels from 2 to 3 feet high in their class seem to have suffered severely. Abies Douglasi, Menziesii, Pinus Ponderosa, all from 15 to 20 feet high, and from 100 to 200 feet above sea-level, on all exposures, and soil generally a little peat or gravel, not in the least injured. Common forest trees, as high as 900 feet above sea-level, safe. None of the Cedars touched. With one or two exceptions, nothing has suffered more than in any ordinary season.

No. 80.—NEWTON AND THE GARIOCH, *Aberdeen*; above Sea-Level, about 350 feet; Lowest Indication of Thermometer, –8°; Depth of Snow, about 3 feet.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Abies Canadensis	6	10	Clay	Partly rock	S.	Has stood well
Araucaria Imbricata	4	6	do.	do.	do.	A good deal tarnished at points
Arbor Vitæ (Chinese)	4	10	do.	do.	do.	Suffered much, but alive
Amigdalus Incana	Various	Various	do.	do.	do.	Completely destroyed
Arbutus (varieties)	do.	do.	do.	do.	do.	Do.
Cedrus Deodara	8	10	do.	do.	do.	Very nearly dead
Do. Rubra	12	14	do.	do.	do.	Have stood well
Do. Libani	Various	Various	do.	do.	do.	Do.
Do. Atlantica	do.	do.	do.	do.	do.	Do.
Cryptomeria Japonica	10	12	do.	do.	do.	Very much injured
Deutzia Scabra	Various	Various	do.	do.	do.	Very slightly injured
Hollies	10	20	do.	do.	do.	Completely destroyed
Juniperus Recurva	5	8	do.	do.	do.	A good deal injured, but alive
Do. Pendula	4	10	do.	do.	do.	Completely killed
Do. Squamata	Various	Various	do.	do.	do.	Hardy; very slightly tarnished
Laurels and Bays	do.	do.	do.	do.	do.	Dead to snow-line
Pinus Cembra	10	12	do.	do.	do.	Very hardy; stood well
Do. Douglasi	20	12	do.	do.	do.	Do. do.
Do. Pungens	6	5	do.	do.	do.	Completely destroyed
Do. Excelsa	10	10	do.	do.	do.	Almost all dead
Do. Lambertiana	7	5	do.	do.	do.	A good deal injured
Do. Nobilis	5	7	do.	do.	do.	Stood well.
Do. Pinsapo	Various	Various	do.	do.	do.	Do.
Quercus Ilex	do.	do.	do.	do.	do.	Completely killed
Rhododendrons (various)	do.	do.	do.	do.	do.	Many of them destroyed
Roses (various)	do.	do.	do.	do.	do.	Completely destroyed
Rhododendrons Faulkneri	do.	do.	do.	do.	do.	Do.
Do. Victoria	do.	do.	do.	do.	do.	A good deal tarnished
Do. Glaucum	do.	do.	do.	do.	do.	Hardy; stood pretty well
Do. Moultan	do.	do.	do.	do.	do.	Very severely injured
Do. Niveum	4	do.	do.	do.	do.	Stood well

No. 80.—Newton and the Garioch, *Aberdeen*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Thuja Gigantea	1	2	Clay	Partly rock	S.	Has stood well
Taxus Adpressa	3	4	do.	do.	do.	Do.
Tulip Tree (various)	8	10	do.	do.	do.	Very much injured
Wellingtonia Gigantea	1	2	do.	do.	do.	Has stood well
Weigelia Rosea	3	..	do.	do.	do.	Stood pretty well

Clematis on wall (beside a number of Roses killed) uninjured.

No. 81.—Scobbach Castle, *Aberdeen*; above Sea-Level, 200 ft.; Lowest Indication of Ther., about zero; Depth of Snow, 18 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Hollies	Various	Various	Poor thin soil	Clay or slate rock	N.	These have suffered but nothing to the extent they did four or five years ago, when the frost was more severe
Portugal Laurels,	do.	do.	do.	do.	do.	
Scotch Fir	12 to 20	20 to 23	..	..	..	These have not been damaged by the frost of last winter. The snow having fallen when it was quite quiet, lay so heavy on the Spruces and Scotch Firs that it broke down a good many branches of the latter
Spruce	12 to 20	20 to 23	..	..	..	
Larch	12 to 20	20 to 23	..	..	..	
Ash	12 to 20	20 to 23	..	..	..	
Elm	12 to 20	20 to 23	..	..	..	

No. 82.—Mar Lodge, Braemar, *Aberdeen*; above Sea-Level, 1200 feet; Lowest Indication of Thermometer, – 11° on 24th December; Depth of Snow, about 2 feet.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	4	6	Light	Rocky	N.	Safe (covered by brushwood)
Berberis Darwinii	6	10	Loamy	do.	do.	Quite hardy
Bay (Laurels)	3	20	do.	do.	S.	Frosted much; wood not ripe
Ilex Aquifolium	3	20	do.	Gravel	do.	Young wood gone; frosted before ripe
Cedrus Deodara	4	10	Light	Rocky	N.	Healthy, but requires shelter in winter
Mahonia (various)	6	10	Loamy	do.	do.	Quite hardy
Rhododendrons	4	10	do.	do.	do.	Hardy, but no flowers
Taxus Baccata	12	30	Light	do.	S.	Healthy, but well sheltered

No 83.—Balmoral, *Aberdeen*; above Sea-Level, 870 feet; Lowest Indication of Thermometer,—6° on 25th December; Depth of Snow, about 3 feet.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Araucaria Imbricata	3 to 4	8	Dry light sandy	Open gravel	N.E.	Killed
Cedrus Deodara	3	6 to 7	do.	do.	N. & N.E.	Slightly injured
Cryptomeria Japonica	4 to 5	7 to 8	do.	do.	S. & N.E.	Very slightly injured
Cupressus Lambertiana	2 to 3	5 to 6	do.	do.	N.E.	Killed to the ground
Do. Macrocarpa	3	6 to 7	do.	do.	do.	Do. do.
Do. Sempervirens	3	6 to 7	do.	do.	do.	Do. do.
Common Laurels	Various	Various	do.	do.	Various	Much injured where exposed
Pinus Nobilis	9 inches	3	do.	do.	N. & N.E.	Uninjured
Do. Nordmanniana	2 to 3	6	do.	do.	N.	Do.
Do. Pindrow	2 to 3	5	do.	do.	N. & N.E.	Do.

No. 83.—Balmoral, *Aberdeen*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Pinus Excelsa	1 to 2	4	Dry light sandy	Open gravel	N.	Slightly injured, but recovering
Do. Ponderosa	1 to 2	5	do.	do.	N.E.	Uninjured
Do. Douglasi	3	5 to 6	do.	do.	N.	Do.
Do. Smithiana	1	3	do.	do.	do.	Do.
Wellingtonia Gigantea	2	6	do.	do.	N.E.	Slightly injured
Ayrshire Roses	10 feet	Various	do.	do.	N. wall	Killed to the ground
No. 84.—Invercauld, *Aberdeen*; above Sea-Level, 1100 ft.; Lowest Indication of Ther., −11°, 23d Dec.; Depth of Snow, about 2 ft.						
Araucaria Imbricata	Various	Various	Light sandy loam	Loose gravel	S.W.	Killed by spring frost
Cedrus Deodara	do.	do.	do.	do.	do.	Stood well, but cut up by spring frost
Laurel (common)	do.	do.	do.	do.	do.	Stood well
Laurel (Portugal)	do.	do.	do.	do.	do.	Do.
Rhododendron Ponticum	do.	do.	do.	do.	do.	Do.
Common Yew	do.	do.	do.	do.	do.	Do.
Natural-planted Firs, Birch, Larch, and Spruce	do.	do.	do.	do.	do.	All stood well
Roses (various)	do.	do.	do.	do.	do.	Very much cut up by winter
No. 85.—Forss, near Thurso, *Caithness*; above Sea-Level, 50 to 60 ft.; Lowest Indication of Ther., 10°; Depth of Snow, 15 to 18 in.						
Araucaria Imbricata	7½	..	Brown & peaty loam	Ferruginous clay	S.E.	Uninjured; small plants slightly hurt
Abies Douglasi	2	..	do.	do.	do.	Lower branches browned
Do. Menziesii	5½	..	do.	do.	do.	Uninjured
Do. Smithiana	1½	..	do.	do.	do.	Do.
Do. Morinda	2	..	do.	do.	do.	Do.
Do. Orientalis	2	..	do.	do.	do.	Do.
Berberis Nepaulensis	Various	..	do.	do.	do.	Dead
Do. Japonica	do.	..	do.	do.	do.	Uninjured
Cedrus Deodara	9	..	do.	do.	do.	Branches slightly browned at points
Do. Argentea	4	..	do.	do.	do.	Do. do. do.
Cupressus Lambertiana	Various	..	do.	do.	do.	Very much injured
Do. Macrocarpa	do.	..	do.	do.	do.	Do. do.
Do. Lawsonii	do.	..	do.	do.	do.	Uninjured
Do. Torulosa	do.	..	do.	do.	do.	Much browned
Daphne Indica Rubra	do.	..	do.	do.	do.	Dead
Ilex	8	..	do.	do.	do.	Uninjured
Juniperus Hibernica	8	..	do.	do.	do.	Healthy
Do. Chinensis	8	..	do.	do.	do.	No injury
Lauristinus	Various	..	do.	do.	do.	Withered to the ground
Libocedrus Chilensis	do.	..	do.	do.	do	Dead
Laurel (Bay)	do.	..	do.	do.	do.	Browned a little

No. 85.—Forss, near Thurso, *Caithness*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Laurel (Portugal)	Various	..	Brown & peaty loam	Ferruginous clay	S.E.	Uninjured
Picea Cephalonica	9	..	do.	do.	do.	Do.
Do. Nobilis	9	..	do.	do.	do.	Do.
Pinus Excelsa	6	..	do.	do.	do.	Do.
Do. Austriaca	5½	..	do.	do.	do.	Do.
Do. Insignis	..	..	do.	do.	do.	Hurt very much
Do. Pyrenaica	4½	..	do.	do.	do.	Uninjured
Do. Mugho	2½	..	do.	do.	do.	Do.
Rhododendron (various)	Various	..	do.	do.	do.	Do.
Retinisphora Ericoides	do.	..	do.	do.	do.	Dead
Roses (standard)	do.	..	do.	do.	do.	Suffered very much
Thuja Aurea	do.	..	do.	do.	do.	Very much browned
Do. Chilensis	do.	..	do.	do.	do.	Killed
Do. Tartarica	2	..	do.	do.	do.	Uninjured
Do. Plicata	2½	..	do.	do.	do.	Do.
Do. Gigantea	Various	..	do.	do.	do.	Browned very little
Do. Occidentalis	2½	..	do.	do.	do.	Uninjured
Thujopsis Borealis	Various	..	do.	do.	do.	Do.
Taxus Stricta	2	..	do.	do.	do.	No injury
Do. Baccata	3	..	do.	do.	do.	Browned a little
Do. Fastigiata	4	..	do.	do.	do.	Quite healthy
Wellingtonia Gigantea	1½	..	do.	do.	do.	Uninjured

No. 86.—Rosehaugh, *Ross-shire*; above Sea-Level, about 500 ft.; Lowest Indication of Ther., 6°; Depth of Snow, about a foot.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Various	Various	Various	Light sandy loam	Gravelly clay or sandstone	S.	Trees and shrubs generally have not been much affected by the frost of 1860, or more than in an ordinary season
Roses (various)	..	..	..	..	..	Have all suffered severely by the frost

The severe wind of October 3, 1860, felled a large number of forest trees in Ross-shire, doing more damage than the frost.

No. 87.—Stornoway Castle, Lewis, *Ross-shire*; above Sea-Level, 70 feet; Lowest Indication of Thermometer, 17° at 120 feet above Sea-Level; Depth of Snow, 14 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Escallonia Macrantha	3	10	Peaty	Debris of granite	S.	Tips of leaves a little browned
Juniper (various)	2	10	do.	do.	do.	Do. do.

No. 88.—Montford, *Bute*; above Sea-Level, 50 feet; Lowest Indication of Thermometer, 22°; Depth of Snow, 12 inches.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
Arbutus Unedo	12	15	Mixed clay and loam	Whin and freestone	E.	Uninjured
Alaternus Rhamnus	10	15	do.	do.	do.	A little browned
Araucaria Imbricata	8	9	do.	do.	do.	Uninjured
Azalea Indica	3	6	do.	do.	do.	Do.
Do. Alba	3	6	do.	do.	do.	Do.
Do. Rubra	3	6	do.	do.	do.	Do.
Cedrus Deodara	20	..	do.	do.	do.	Do.
Cryptomeria Japonica	12	12	do.	do.	do.	Do.

No. 88.—MONTFORD, *Bute*—Continued.

Species reported on.	Height.	Supposed or known Age.	Nature of Soil.	Subsoil.	Exposure.	Remarks as to Effect of Frost, and Subsequent Treatment.
	feet.	years.				
Camelia Japonica	10	Old	Mixed clay and loam	Whin and freestone	E.	Quite uninjured, and no protection
Cupressus Lawsonii	4	3	do.	do.	do.	Uninjured
Fuchsia (various)	Various	Various	do.	do.	do.	Do.
Farfugium Grande	do.	do.	do.	do.	do.	Do.
Hydrangea	6	Old	do.	do.	do.	Do.
Clianthus Punicens	Various	Various	do.	do.	do.	Do.
Laurel (Sweet Bay)	25	Old	do.	do.	do.	Do.
Lauristinus	12	20	do.	do.	do.	Do.
Myrtle	10	20	do.	do.	do.	Do.
Passiflora	Various	Various	do.	do.	S. wall	Do.
Taxodium Sempervirens	15	18	do.	do.	E.	Do.
Veronica Andersonii	Various	Various	do.	do.	do.	Do.
Verbena (sweet scented)	do.	do.	do.	do.	S. wall	Do.
Wellingtonia Gigantea	5	7	do.	do.	E.	Do.
No. 89.—BUTTGUOY, near KIRKWALL, *Orkney*; above Sea-Level, 70 feet; Lowest Indication of Ther., 18°; Depth of Snow, 14 inches.						
Alder	12	36	Clay	Clay	W.	No injury whatever
Larch	Various	Various	do.	do.	do.	Do.
Pines (Fir)	do.	do.	do.	do.	do.	Do.
Sycamore	do.	do.	do.	do.	do.	Do.
Willow	10	do.	do.	do.	do.	Do.
White Poplar	25	25	do.	do.	do.	Do.
Climate of Orkney very mild; blights in Orkney are caused by wind rather than by frost, and generally by W. & S.W. wind, *not* E. wind as elsewhere						
No. 90.—BIRSTANE, *Orkney*; above Sea-Level, 150 feet; Lowest Indication of Thermometer, 18°; Depth of Snow, 14 inches.						
Alders	Various	12	Black soil.	Clay	E.	No injury at all from frost
Larch	do.	12	do.	do.	do.	Do. do.
Pines (Firs)	do.	12	do.	do.	do.	Do. do.
Sycamore	do.	12	do.	do.	do.	Do. do.
Willow	do.	12	do.	do.	do.	Do. do.
White Poplar	do.	12	do.	do.	do.	Do. do.
Whins	5	12	do.	do.	do.	Do. do.
No. 91.—HALL OF TANKERNESS, *Orkney*; above Sea-Level, 40 feet; Lowest Indication of Thermometer, 18°; Depth of Snow, 14 inches.						
Alders	15	25	Black soil	Clay	W.	No injury sustained
Larch	15	25	do.	do.	do.	Do.
Pines (Firs)	15	25	do.	do.	do.	Do.
Sycamore	15	25	do.	do.	do.	Do.
Willow	15	25	do.	do.	do.	Do.
White Poplar	15	25	do.	do.	do.	Do.

No. 92.—SANDWICK, *Orkney*; above Sea-Level, 94 feet; Lowest Indication of Thermometer, 15° 5″; Depth of Snow, 1 foot.

No remarkable effects of the frost of December and January perceived here. In fact, very few Evergreens thrive well in Orkney from the effects of the sea spray on their leaves in winter.

ARE THE LONG-WOOLLED SHEEP OF TWEEDSIDE PURE LEICESTERS?

By John Wilson, Edington Mains, Berwickshire.

Happening a short time ago to meet with an acquaintance who is a breeder of Leicester sheep, our conversation turned upon the discussions which had taken place last year, first at Kelso and afterwards in Edinburgh, upon the proposal which had been made to have in future two distinct classes of Leicester sheep at the Shows of the Highland Society. This naturally enough led to the question which I have placed at the top of this communication. As the gentleman referred to seemed much interested by some facts which I then adduced in support of the affirmative of this question, and expressed the opinion that they would be equally interesting to many others, I am induced to give them publicity in the Journal of the Highland Society.

All who take an interest in this question are aware that the proposal referred to above was made with the view of obviating the very great dissatisfaction which has again and again been produced by the way in which the premiums for Leicester sheep have been awarded at the Shows of the Highland and Agricultural Society of Scotland. The Directors of that Society, with the laudable motive of avoiding partiality, or even the appearance of it, have usually endeavoured to procure judges wholly unconnected with the district in which their Show is held, and have frequently obtained a portion of them from the midland counties of England. When the latter class of judges have been a majority, as at the last Show at Berwick, they have with perfect consistency awarded the prizes in every instance either to sheep from the south, or, failing these, to such as approached the nearest to the English type. And so it has happened that the Border sheep, although constituting the vast majority in point of numbers, have been entirely ignored, and the prizes have been given to animals which, in the opinion of nearly every spectator, were utterly inferior to all the better specimens of those which had been passed over. In such cases the third judge, being usually a north country breeder, has been placed in the disagreeable position of having to dissent from his colleagues at every decision, and had better not have been there at all. At Perth last year the case was reversed; as two of the judges were Scotch and one Irish. The latter, having been used to sheep of the English type, could only look on and see his colleagues award the prizes quite contrary to his judgment. I do not see how the Directors could have come to any other decision than that which they adopted —viz. to deal with all Leicester sheep as constituting one breed. At the same time I am fully persuaded that their premiums will never be awarded in a way that will secure the confidence of the mem-

bers of the Society, unless the decisions are made by men who at least recognise the genuineness of the Border sheep, and their eligibility to carry prizes when of sufficient merit. Now, it is well known that this is not the case with breeders from the midland counties of England, who, for the most part, have no scruple in expressing the opinion that our Border sheep are not Leicesters at all. And our south country neighbours, while refusing to call our sheep *Leicesters*, have provided another name for them. In most of the reports of the recent Show at Leeds, notice was taken of an experiment then in progress on the farm where the steam-ploughs were tried, for the purpose of testing the comparative merits of a number of different breeds of sheep, amongst which was enumerated the *Barmshire* breed. Again, in the prize report on the farming of Yorkshire, in the 22d volume of the 'Journal of the Royal Agricultural Society of England,' p. 122, the author speaks more than once of the *Barnshire* breed of sheep. Now, I daresay, many persons, in reading these reports, must have been puzzled as to the locality of this *Barm* or *Barn* shire, and may have felt some curiosity to know what kind of sheep was referred to. The explanation is just this: A fair for the sale of draft-ewes has for a very long time been held annually, in the month of September, near Wooler, in Northumberland, which, from the day in the calendar on which it takes place, is known as St Ninian's, or, in northern dialect, St Ringan's fair. The site of this fair lying in the part of Northumberland which in the olden time was called Bamboroughshire, the graziers and dealers from Yorkshire, by whom these ewes used to be bought, got into the way of calling their purchases "Bamboroughshire sheep," which for handiness was shortened into *Bampshire*, and has now, as we have seen, got varied into *Barmshire* and *Barnshire*. The fair just referred to has now greatly declined from its former importance, in consequence of the annual drafts of ewes from the innumerable flocks of Northumberland, Merse, and Teviotdale being bought up at home, or at local markets, by dealers who convey them by rail to the great markets annually held at York, Harwood, &c. Forty years ago the sheep bred in the districts just referred to were all but exclusively Leicesters, and it was to these that the name Bampshire was first applied. About that date, however, many of our farmers began to try a cross betwixt Cheviot ewes and Leicester rams, and these two breeds were found to blend so readily, not only in a first cross, but also with a continued use of the pure Leicester ram and the cross-bred ewes for successive descents, and to produce so useful an animal, at once hardy, prolific, of good size, with great aptitude to fatten, and excellent quality both of wool and mutton, that this mixed breed rapidly superseded the pure Leicester, *except in the case of ram-breeding flocks.* I may here notice that in the Border districts a pure Leicester is invariably called a *bred* sheep *par excellence.* Sheep of the first

and second cross betwixt Leicester and Cheviot are in like manner called half-*bred*, or two-parts *bred*, as the case may be; but when they are the produce of a pure Leicester ram and ewe of the mixed breed of three or four or more descents, I suspect that, when taken south, the old name of Bampshire is often applied indiscriminately to them as well as the pure Leicesters. The latter, as I have said, are now found only in the hands of regular ram breeders; but that their flocks are still comparatively numerous, may be inferred from the fact that, at the ram fair now annually held at Kelso in the month of September, from 1600 to 2000 shearling Leicester rams are presented for sale, and are most of them bred in the surrounding district.

And now again for the question, Are these rams really pure Leicesters? They certainly differ much in appearance from the type of sheep now found in the midland counties of England. They are stronger in the bone, larger in frame, have white faces and legs, and are altogether of a more robust form than their modern English kindred. Are these diversities, then, due to crossing, or are they entirely owing to selection, and the influence of climate? Now, without claiming absolute purity for every flock, I do believe that those of the best breeders on the Borders can establish as direct and pure a descent from Bakewell's flock as any now to be found elsewhere. Let us inquire when, and by whom, the Leicester breed was first introduced to the Borders. It is well known that this was largely due to the Messrs Culley who, in 1767, migrated from the county Durham to Tweedside, and brought with them excellent breeds of live stock, and in particular a flock of sheep of the pure Leicester, or *Dishley* breed, as they were then called. Mr George Culley was the personal friend of Bakewell, and the author of a treatise on live stock, in which his description of the Dishley breed of sheep quite corroborates the opinion which it is my present object to substantiate. Another person who took a leading part in introducing the new breed was the late Mr Robert Thomson of Lilburn, and afterwards of Chillingham Barns in Northumberland, who in his youth resided for some time with Bakewell as his pupil, and whose flock, long known as one of the best on the Borders, was bred directly from Bakewell's. I cannot of course speak of the flocks of the breeders now named from personal observation, as they had all either died or retired from business by the time I began; but I inherited from my father a flock of Leicesters which had been bred chiefly from their flocks, and I have thus been familiar from my earliest years with the style of sheep which they introduced. About thirty-five years ago, and for many subsequent years, there existed a small flock of Leicesters, the property of Mr Luke Scott, formerly tenant of Easington Grange, near Belford, which I knew well, and which, in several respects, may be said to have been unique. Mr Scott, although a steady and upright man, had not

prospered in business. From ever I knew him he had no farm of his own, and his little flock, numbering some twenty ewes and their produce, to which he clung with fond affection and an almost desperate tenacity, was boarded out, sometimes in one place and sometimes in another, often exposed to great straits, and never enjoying anything like fair treatment. He has often told me that the foundation of this flock was laid by the purchase of a few shearling ewes from a Mr Yellowly, then in good repute as a breeder of pure Leicesters. As long as Mr Robert Thomson continued a breeder, Mr Scott had used only rams, or their progeny, of his own breeding; and for the 20 or 25 years which elapsed betwixt Mr Robert Thomson's retirement from business and the final breaking up of Mr Scott's little flock, the latter was maintained entirely by the use of his own rams. So jealously did this exclusive old man watch over the purity of his idolised little flock, that I recollect of his telling me how a favourite ewe had made her escape from the enclosure in which she was confined, and had got access to a ram of a neighbouring flock. Most persons would have thought it enough in such circumstances to have sold or destroyed the progeny of this *mesalliance*; but so irremediably did the old man consider his ewe to have been contaminated, that, favourite as she was, he caused her instantly to be slaughtered. Mr Scott let out on hire as many of his rams as he could, but never sold either male or female except to be slaughtered. And what, then, were the characteristics of this interesting little flock, separated from Bakewell's by but one intermediate link? Their faces and legs were invariably white—as much so as any Cheviot's. Their wool formed a close-set, compact fleece, inclining to coarseness in the breech, and often scanty, or altogether awanting, on the belly. The rams carried their heads well up, being strong and full in the neck-vein, and remarkably wide in the chest. They were particularly clean in the legs, and seldom suffered from foot-lameness. They were very vigorous and active, and in token of this were pugnacious to a fault, being more troublesome in this respect than the rams of any breed of sheep I have ever had to do with. Owing to their own purity of breeding, they possessed in a remarkable degree the capacity of imparting their own characteristics to every flock into which they were introduced. Mr Scott never had many of our ram breeders as direct customers, as they objected to the comparative want of size of his sheep; bnt I have the best means of knowing that most of them freely availed themselves of his blood by hiring rams from those who did deal with him directly. So much was this the case, that there is probably no Leicester flock on the Borders of any considerable reputation that has not this blood largely in it. The comparative want of size to which I have just referred, always appeared to me to be less an inherent quality than the inevitable consequence of long-continued hardships. I

have thus shown that we got the genuine Bakewell blood to begin with, and that, in one instance at least, it was preserved amongst us until a very recent date in a degree of purity not equalled anywhere else, unless, perhaps, in Mr Valentine's flock. Let me not, however, be misunderstood as if I wished to convey the impression that the breeders whom I have named were the only persons on Tweedside who were direct introducers of Bakewell's blood. There were many others whom I cannot enumerate. I may mention, however, as being Berwickshire breeders, the late William Robertson, Esq., of Ladykirk, and his tenant and intimate friend the late James Thomson, Bogend, who both, down to a yet recent date, went annually to Leicestershire and hired rams from the best flocks there. Mr Robertson's flock of about eight hundred ewes was dispersed in consequence of his death about 1830, and is still represented in the district. Mr Thomson's remains intact in the hands of his grandson at Mungo's Walls, and is still used as a ram-breeding flock.

Much as the Leicester sheep of the South and of the Borders now differ from each other, I believe that both can equally claim and prove direct descent from Bakewell's flock. Diversity of climate and of general treatment, and diversity of taste in the breeders, have for a prolonged period been at work to produce the change; and these are influences potent enough to account for all the change which has actually taken place, although both started with like materials. Bakewell, we know, had just the common long-woolled sheep of his day to work upon; and he, by skill and perseverance, so changed them as to originate what has ever since been recognised as a distinct breed. The materials which proved so plastic in his skilful hands are still as susceptible of modification as ever they were. As a matter of fact, not our sheep only, but all our domesticated animals are constantly varying. It is not only the flocks of widely remote districts that exhibit this variation; it can be seen any day, and everywhere, by comparing together any given number of flocks in the same neighbourhood, each of which will be found to have well-marked family features, by which it can be readily discriminated from the others.

The point of real practical importance is, that everywhere the Leicester breed retains the qualities which from the first made it so valuable. It is true that it is not now put to the same use as formerly. It no longer yields directly our staple supplies of butcher-meat; but crosses betwixt it and the Downs in the south, and betwixt it and the Cheviots and Blackfaces in the north, now constitute the main supplies to all our markets.

January 1862.

Before publishing the foregoing statements, it occurred to me that it would be well to submit them to two gentlemen who I knew were well qualified to judge of their accuracy—viz. John

Gray, Esq., of Dilston, and Thomas Scott, Esq., late of Beal. It is with peculiar gratification that I append the following excerpts from the letters with which they favoured me on returning my manuscript. Mr Gray says:—

"I have been favoured by reading your paper on the genuineness of the Border Leicester, and, as I am going from home in the morning, I give you, at a late hour, a hasty line, to say how entirely my opinion concurs with your own as to the still existing purity of the *ram-breeding* flocks in the Border counties. . . . I quite agree with all you say of George Culley and Robert Thomson, first at Lilburn (when the first sale by auction in the North of a pure-bred Bakewell flock took place) and next at Chillingham Barns, where he had annual lettings, at which I took rams, and learned my first lessons in the symmetry and quality of the pure Leicester. I well remember also his sale of all his flock there in May 1814, when I was, though young, one of the judges, and presided at the dinner in a barn full and overflowing. I regularly attended the public lettings at Mr Culley's too, and hired rams very often. Those two flocks were certainly pure Leicesters, if Bakewell's were pure,—and we can go no farther back. But then there were two families in Bakewell's flock, distinguished as *blue-caps* and *red-legs*, which came out at times in their descendants. You must have seen and known a kind of Leicester with blue faces, generally bare on the scalp, and red when lambed, and when mature, easily broken by flies, on which account they were not favourites with the shepherds. They were good feeders, but light of wool. The red or brown legs were a hardier tribe, and good in carcass also. I remember one of the best rams I ever had being of that kind—hired at sixty guineas from Mr Thomson (descended from Bakewell's). That class of sheep was then used and approved by Messrs Jobson of Turvilaws, Vardy of Fenton, Smith of Norham, Smith of Hayfarm, &c., &c., and continued in those families until within the last twenty years. So long as a sheep-flock was kept at Millfield Hill no alloy or impure cross was ever admitted; but yet the character of the sheep was rather altered to suit the taste of those who hired my rams. The original breed was from Thomson's and Culley's, my father having bought gimmers from Thomson at an early time. By way of a change, I hired sheep from Burgess, and then I had three for two years from Lord Althorp, got by Buckley's best ram, called Big B., which his Lordship had for two seasons. Those sheep were perfect as to shape and quality, but on a low leg, with a round full carcass, fulfilling Bakewell's toast, 'small in size and great in value.' If I had fed all my sheep to the end for the fat market none could have paid better than those for early maturity and the amount of mutton produced per acre, although not in large frames; but in that neighbourhood all the ewes are sold for breeding another year in Yorkshire, and the buyers liked them to stand on a higher leg, and make a bigger, if not better, show in the pens at York and Wakefield; and so also with dinmonts sold in the autumn to be fed in the South. Chiefly on this account, and partly because many farmers reckon more by the price they get *per head* than by the *aggregate amount* of mutton and wool in sheep of smaller size, I was induced to follow the public taste and to cultivate a larger-sized sheep, but without sacrificing purity of blood. This taste prevailed, I think, pretty generally on the Borders, and has wrought, together with the effects of climate, in changing considerably the look and character of the Leicester sheep in those parts from that of the original Leicester of that county and Warwickshire, &c. I have seen most marked changes produced by local circumstances on Leicester sheep. I once bought some shearling rams in this county for a friend in Ireland. I saw the sheep in Queen's County three years after, and could hardly believe them to be the same, so coarse were they in wool, and so changed in char-

acter. . . . You are quite right as to the origin of the name Barm, or Barnshire sheep. I remember old Green, a large buyer from Yorkshire in the beginning of this century, who always used that term in speaking of the draft ewes he bought in Bamboroughshire and Glendale. Your account of old Luke Scott's little flock is very curious and strictly true. I knew him at Easington, and used to meet him at the shows at Chillingham Barns. The last of his diminished flock was at a poor place by the road south of Wooler, called Plea Place, where his son once asked me to stop and look at a sheep which he thought combined in perfection what I had described at some meeting as the true qualities of a pure Leicester. . . . The flocks at Ladykirk and Bogend were purely Leicester to the end, if Leicestershire rams hired at good prices were pure. I had the privilege of being well acquainted with both Mr Robertson and Mr Thomson, who for many years used to have their horses rested with me in passing Millfield Hill, so that I might have a view of the rams. But even in these there was as great a difference between those from Stone, Stubbins, Burgess, and Buckley, as now exists between those of Nottinghamshire and Northumberland."

Mr Scott says :—

"Your remarks are in perfect accordance with my recollection of the conversations which I have heard upon the subject by my seniors. There is nothing I could add of my knowledge to the very full history you have given of the breed in this district."

PROCEEDINGS IN THE LABORATORY.

By Thomas Anderson, M.D., F.R.S.E., Chemist to the Society.

I. NOTE ON SOME REMARKABLE CARGOES OF PERUVIAN GUANO.

It is generally understood that Peruvian guano is a manure of great uniformity in composition, and there is no doubt that in this respect it surpasses every other variety of guano, as well as most manufactured manures. Still it is liable to considerable variations in quality, more especially in relation to the proportion of ammonia it contains, which oscillates in different samples of the perfectly genuine and sound article between 15 and 18, and sometimes rises as high as 19 per cent. Although such differences have a most material influence upon the value of the manure, they are not recognised in the price, and hence but little attention has been paid to them by the farmer. It would appear that the composition of the guano is greatly dependent on the part of the deposit from which it is obtained; and I have observed that in particular seasons the quality of the imports has been below the average, and in others above it, and this no doubt was because different parts of the beds were worked at these times.

During the last year or two a considerable quantity of guano

has been imported of a dull greyish-brown colour, very different from that yellowish tint which is generally recognised as characteristic of the produce of the Chincha Island, and this has led to suspicions of adulteration on the part of purchasers which, however, have *not generally any foundation*, as these samples are quite up to the average. Several cases, however, have recently occurred in which cargoes of a very unusual composition have been imported.

The first of these to which I shall advert was that of a very large cargo of what appeared excellent guano, and of which a considerable portion had been sold from the ship's side, when circumstances were observed which excited the suspicion of the merchant, and a sample was sent me for analysis. In contained—

Water,	11.29
Organic matter and ammoniacal salts,	41.53
Phosphates,	20.57
Alkaline salts,	15.86
Sand,	10.75
	100.00
Ammonia,	12.58
Phosphoric acid in the alkaline salts equal to 5.54 phosphate of lime,	2.56

The large amount of sand and of alkaline salts here indicated an inferiority to the extent of nearly 25 per cent. The *sand* in this case was of a very peculiar kind, consisting of large grains mixed with small rounded pebbles about the size of a pea, and rarely reaching that of a bean, and was obviously not an adulteration. As soon as these facts were observed, analyses were made of different parts of the cargo with the result of showing that there was considerable variety in it. Several of these analyses I subjoin—

	No.1.	No. 2.	No. 3.	No. 4.
Water,	11.92	12.42	13.42	11.98
Organic matter and ammoniacal salts,	50.83	47.51	41.16	37.77
Phosphates,	23.50	18.86	21.62	19.87
Alkaline salts,	9.53	13.98	10.37	12.31
Sand,	4.22	7.23	13.43	18.07
	100.00	100.00	100.00	100.00
Ammonia,	15.81	14.46	12.67	10.88
Phosphoric acid in the alkaline salts,	0.94	4.34	2.77	2.48
Equal to phosphate of lime,	6.37	9.40	6.01	5.37

The occurrence of so large a quantity of sand in a genuine Peruvian guano (for there was no doubt about its being in the state in which it left the island), led to some inquiry as to its cause, and it turned out that the vessel, being a new and very fine one, the captain was unwilling to run the risk of waiting till his turn

for loading came, and shipped his guano from a part of the island which had not been previously worked. Several other ships loaded at the same time from the same spot, but whether their cargoes passed unchallenged into the hands of the farmer I do not know. I have analysed one similar sample, said to be from another cargo, but the history of which I have been unable to trace. It contained—

Water,	10.63
Organic matter and ammoniacal salts,	43.63
Phosphates,	23.70
Alkaline salts,	13.24
Sand,	8.60
	100.00
Ammonia,	14.03
Phosphoric acid in the alkaline salts, equal to 5.39 phosphate of lime,	2.49

About a year after the importation of this cargo another appeared, containing lumps of a very unusual appearance. They were not the soft whitish masses found in all good Peruvian, but were hard saline substances, which required a sharp blow of the hammer to break them, and then showed a dark-grey appearance, and crystalline fracture. Several analyses of samples, in which the lumps and powdery part of the guano had been ground up together, were made, and showed considerable differences. They gave the following results :—

	No. 1.	No. 2.	No. 3.
Water,	12.90	12.55	16.01
Organic matter and ammoniacal salts,	46.25	42.25	34.04
Phosphates,	19.45	19.20	15.55
Carbonate of lime,	...	...	1.78
Alkaline salts,	14.25	15.45	18.87
Sand,	7.15	10.55	13.75
	100.00	100.00	100.00
Ammonia,	14.91	14.14	11.05
Phosphoric acid in the alkaline salts,	1.66	1.00	0.70
Equal phosphate of lime,	3.59	2.16	2.21

The lumps which occurred in this guano were many of them of large size, weighing, in some instances, several pounds, and they had a saline taste. Their analyses gave—

	No. 1.	No. 2.	No. 3.
Water,	6.55	5.83	2.54
Organic matter and ammoniacal salts,	35.05	31.51	23.57
Phosphates,	9.25	7.90	3.58
Sulphate of lime,	5.56	...	...
Alkaline salts,	32.49	33.43	43.24
Sand,	11.10	21.33	27.07
	100.00	100.00	100.00

Ammonia,	9.00	8.12	5.39
Phosphoric acid in the alkaline salts,	0.38	0.83	trace
Equal to phosphate of lime,	0.81	1.79	...

The alkaline salts in all these cases consisted chiefly of common salt, the exact amount of which was only determined in No. 2, and was found to be 26.89 per cent. It is obvious that this guano must have been taken from the lower parts of the bed, where it had, during its deposition, been exposed to the spray of the sea, and this evaporating must have produced a quantity of salt by which the particles of the guano and sand had been agglutinated into lumps, or, more correctly, into a continuous mass, which had been broken up and mixed with the superincumbent guano. The proof of this is afforded by the analysis of the powder separate from the lumps, which gave :—

Water,	14.95
Organic matter and ammoniacal salts,	49.47
Phosphates,	21.17
Alkaline salts,	9.61
Sand,	4.80
	100.00
Ammonia,	17.37
Phosphoric acid in the alkaline salts, equal to 6.26 phosphate of lime,	2.89

results which are equal to those given by the best Peruvian.

Samples from another cargo similar to this, in the presence of lumps containing a large quantity of alkaline salts, but without sand, have also been recently examined in the laboratory. Three different samples of the lumps gave:

	No. 1.	No. 2.	No. 3.
Water,	14.02	11.09	8.69
Organic matter and ammoniacal salts,	49.04	38.47	32.06
Phosphates,	16.79	9.71	8.30
Carbonate of lime,	...	...	2.40
Alkaline salts,	19.29	39.94	47.95
Sand,	0.86	0.79	0.60
	100.00	100.00	100.00
Ammonia,	16.24	13.32	10.15
Phosphoric acid in the alkaline salts,	1.59	2.69	0.75
Equal to phosphate of lime,	3.44	5.82	1.63

In these lumps the alkaline salts consisted chiefly of common salt, but with a considerable admixture of alkaline sulphates. No information could be obtained regarding the proportion which the lumps bore to the powder, but it was considerable.

Another cargo, recently imported, shows a different kind of inferiority; containing a large and variable amount of sand.

	No. 1.	No. 2.	No. 3.
Water,	12.99	10.17	5.55
Organic matter and ammoniacal salts	42.51	31.66	20.74
Phosphates,	21.02	18.06	13.19
Sulphate of lime,	3.84	3.28	6.72
Alkaline salts,	6.63	11.47	14.55
Sand,	13.01	25.36	39.25
	100.00	100.00	100.00
Ammonia,	14.14	9.01	5.32
Phosphoric acid in the alkaline salts,	1.01	0.79	0.76
Equal to phosphate of lime,	2.18	1.71	1.64

The occurrence of these peculiarities in Peruvian guano is a subject which ought to excite some attention. All of them have been observed within little more than two years, and before that time irregularities of composition were entirely confined to a comparatively trifling variation in the proportion of ammonia, sand and other foreign matters being quite unknown. It is probable that the explanation of all this is to be found in a more careful clearing of the surface of the rock of which the guano islands is composed, by which means sand, and the salt produced by the evaporation of the spray, have been brought home. And this necessarily excites our suspicion, that the supplies of guano are approaching their end, or at least that the prospect of their exhaustion has led to a more thorough clearance of the surface. Whether this be the case or not, there is no doubt that cargoes inferior to the average are now being occasionally imported. Few of these reach the farmer in the state in which they are brought home, for the importers are most unwilling to admit the possibility of variations, which would render necessary the sale at various prices determined by analysis, and they prefer to mix the inferior guanos with those which exceed the average, and thus to secure uniformity. I know that this was practised in relation to one of the cargoes, whose analysis I have given above. In other cases, however, though not without great difficulty, a reduction in price was obtained.

A case has recently come under my notice in which what I believe to be an inferior Peruvian guano was sold, not under that name, but simply as a "manure." It had all the characters of Peruvian guano, and when analysed gave—

Water,	19.14
Organic matter and ammoniacal salts,	39.39
Phosphates,	18.64
Alkaline salts,	6.08
Sand,	16.75
	100.00
Ammonia,	13.05

Had it been sold as Peruvian guano, and at the full price, I

should unhesitatingly have described this as an adulterated sample; but no such imputation can be thrown on the seller in this case, as the price asked was very moderate, and rather under the real value of the article.

The facts now detailed will naturally induce the farmer to pay more attention to the quality of his Peruvian guano; and if my suspicion that the occurrence of these inferior cargoes indicates the approaching exhaustion of the supplies, we may expect them to become more numerous in future years. In making this observation it is only fair to say, that there appears no reason to anticipate the immediate exhaustion of the guano islands; but we must not shut our eyes to the statement so often made, that a serious inroad has been made into the supplies, and that we must anticipate the cessation of the importation at some period which may not be very remote. It is much better to be prepared for that time than to have it come upon us unexpectedly.

II. ON THE COMPOSITION "ULMATE OF AMMONIA."

A manure has recently been brought into commerce under this name, which merits the attention of the farmer. It is a dark-brown powder, in a high state of division, and is stated to be made by a chemical process, by which woollen are separated from cotton and linen rags. Analysis showed its composition to be—

Water,	9.21
Organic matter and ammoniacal salts,	78.05
Protoxide of iron,	2.88
Carbonate of lime,	2.15
Alkaline salts,	1.74
Sand,	5.97
	100.00
Ammonia (ready formed),	0.88
Nitrogen, 10.44, equal to ammonia,	12.68
Total ammonia,	13.56

It will be noticed that the quantity of ready formed ammonia in this manure is small; and so far the name of Ulmate of Ammonia applied to it would not be chemically correct, although it conveniently distinguishes the substance. As a source of nitrogen, it is likely to prove of very considerable importance; and it especially deserves the notice of the farmer, inasmuch as it brings into use a supply of nitrogen which was formerly lost to agriculture. Woollen rags, as is well known, have long been used as a manure; but the rags of "mixed fabrics," in which cotton and linen often form by much the largest proportion, are of too little value and too bulky to be used by the farmer, and have consequently been neglected by him. So, likewise, the linen and cotton mixed with the

wool have lost the value which they would otherwise have had for the manufacture of paper; and two substances which separately are of value, have by mixture both become valueless. A process for effecting their separation has long been a desideratum, which now appears to have been attained. I do not know the exact process used in the manufactory in which this manure is prepared; but it is probably one patented a short time since, and which, I understand, is in successful operation on a considerable scale. It consists in exposing the mixed rags to superheated steam, that is, steam which has been passed through red-hot tubes. After a sufficiently long exposure to this process, the wool is converted into a brittle state; and when the whole is passed through a machine, similar to that used for making "shoddy," the wool is reduced to powder; and the cotton or linen fibres being uninjured, at the temperature to which they are exposed, are got in a state fitted for the papermakers. This is only one of the many directions in which science has been made to prove useful to the farmer; and as efforts such as these, to bring into a useful state substances which would otherwise be lost, deserve every encouragement, it is to be desired that farmers would make a careful trial of this manure. If it is successful, it is not impossible that processes applicable to other refuse substances may be devised; for there are unquestionably many such matters which, for want of some simple mode of converting them into *marketable* manures, have not yet been rendered available for agriculture.

ON THE AGRICULTURE OF BERWICKSHIRE AND ROXBURGHSHIRE.

By JAMES SANDERSON, Land Valuer, Manchester Buildings, London.

[Premium—£25.]

A FULL report of the agriculture of Berwick and Roxburgh would almost contain a full account of Scottish agriculture; for, with the exception of the dairy farming of Lanark and Ayr, the exclusive crop husbandry of Dumbarton and Stirling, and the meadow farming of Renfrew and Argyle, the counties of Berwick and Roxburgh embrace every variety of Scottish farming. Here are mountainous sheep-ranges, whose only means of improvement are heath-burning, stone-dyke shelter, and open surface-drainage,—steep uplands, whose coarse native herbage has, by surface-liming, been converted into valuable pastures,—broad moorlands and spongy swamps, which the skill and industry of the farmer, by trenching, draining, and liming, is rapidly covering with luxuriant cereal and turnip crops. Here are partly arable and partly pastoral farms, as well as the wholly arable holdings,—cattle-breeding, rearing and fattening,—sheep-breeding of almost every Scottish variety—blackfaced, Cheviots, crosses, and Leicesters; and fattening at all ages—lambs, hoggs, and sheep of three and four years old; and many other varieties of farming. To give full details of such varied modes of farming would require more time than the writer can spare, and would occupy more space in the Highland Society's Transactions than is usually assigned to reports. For the sake of brevity, therefore, the writer shall consider the agriculture of the counties chiefly in the abstract, and not enter into separate details of that of the different counties, or of different districts. Happily the report has only to embrace the state of agriculture in the Border counties during the last twenty-five years, so that the reporter is not required to sketch the agriculture of the times when Dawson of Frogden introduced from England into Roxburgh drill-husbandry—when Meikle invented the thrashing-machine, and Small his swing-plough—and when, in Roxburghshire, the first grain-fanners in Scotland were made and used. These improvements and inventions have, doubtless, not only influenced Scottish agriculture, but that of Europe. It is, nevertheless, during the last twenty-five years that the greatest progress ever made in Scottish agriculture has been effected, and the most valuable improvements have been introduced. Almost within that period the immortal Smith of Deanston devised his thorough system of parallel drainage and deep ploughing; within that period Bell's reaper, long retained only as a model, has assumed a practical bearing, and brought into the field a host of competitors for the honour that the inventor of the best reaper is worthy of; within that period guano, the most

potent fertiliser, has been introduced into Great Britain, and the whole system of farming has been changed.

Towards the end of last century elaborate and valuable reports of the state of agriculture in Berwickshire were written by Low of Woodend, Ker of Ayton, and Aitken Bruce; and that of Roxburgh by the Rev. Dr Douglas of Galashiels. The report of the Rev. Dr Douglas was the ablest of any on the Scottish counties, and was worthy of his ardent devotion to the study of agriculture; while all the treatises on Berwickshire agriculture were remarkable for fulness and accuracy of detail. It is partly from a general acquaintance with the agriculture of both counties, and partly as an ardent lover of agricultural progress, that the writer attempts to follow the footsteps of such writers.

Berwick comprises three great divisions—Lauderdale, Lammermuir, and the Merse, and contains 309,375 imperial acres, of which 150,000 are arable. It is bounded for 25 miles on the east by the sea, on the north by Haddington, on the west by Mid-Lothian and Roxburgh, and on the south by Roxburgh and Northumberland. Its extreme breadth, north and south, is 22 miles, and greatest length 35 miles. Roxburgh comprises the whole of Liddesdale and Teviotdale, and part of Tweeddale, and contains 460,938 imperial acres,* of which 130,000 are arable. Its extreme length is 38 miles, and greatest breadth 28 miles. It is bounded on the north by Berwick and Mid-Lothian, on the west by Selkirk, and on the south by Dumfries, Cumberland, and Northumberland. With the exception of Melrose parish (which somewhat singularly juts in between Berwick and Mid-Lothian, and a part of Berwick, which as singularly juts into Roxburgh at Dryburgh Abbey), its boundaries are natural and easily defined, and it forms an irregular rhomboid, of which the south-east and east sides border on England for sixty miles. Geographically, both counties form the south-eastern division of the south of Scotland, which, with the exception of a small portion of Berwick, which extends to the northern base of Soutra Hill and Castleton parish on the south, which dips towards the Solway, and including a small part of Selkirk, is hemmed in by a continuous chain of mountain-ranges, including the Lammermuir range on the north, Minchmoor and Teviotdale ranges on the west, and the Liddesdale and Cheviot mountains on the south, that, somewhat in the form of a horse-shoe, semicircle both counties.

Although not strictly within the scope of this paper, yet from its important bearing on agriculture, the *geological* character of the counties deserves a passing notice. Geologically considered, both counties are peculiarly attractive, and are characterised by a great

* Since the above was written, the writer has received from the Ordnance Survey the areas of both counties, which he now subjoins:—Roxburghshire, 390,503 acres; Berwickshire, 267,384 acres; Berwick-on-Tweed, 5790 acres.

variety of rock formations and singular rock contortions. In Roxburgh the greywacke is the most extensive formation, occupying probably one-third of the county. It stretches across the county from Mood-law to near Carter-bar, and from Melrose on the north to near Lime Kiln Edge on the south. The hills of this formation are seldom peaked or conical, but rounded on the summits, and gently sloping towards the base, and covered with a thick matting of short grasses. Land on this formation is generally of a dry character, and is easily drained from resting on vertical strata. The red sandstone prevails in the parish of Castleton and all the Kelso and Berwick basins, and is represented by Liddesdale and Kelso sandstones. The old red sandstone occupies nearly all the central area of the county; while the Cheviot range is chiefly porphyritic. All the northern, as well as north-western parishes in Berwick, are chiefly greywacke and trap, and the coast boundary, for a considerable distance south of Cockburnspath, is also of these formations, so that greywacke encircles the carboniferous formation of the Merse.

The topographical features of both counties are singularly diversified by hill and dale, gently flowing streams and rushing rivulets, steep acclivities and gentle undulations. For about 20 miles along the maritime boundary of Berwickshire, extending from Cockburnspath on the north, to near Berwick on the south, the county is exceedingly irregular, and abounds with serrated ridges, gullies, indentations, rugged cliffs, and banks beautifully adorned with copsewood. This irregular belt is, however, only about three miles broad, and forms the eastern fringe of the comparatively level Merse. Leaving this belt at Cockburnspath, and commencing with Whittadder, on the east of the county of Berwick, and following the extreme boundary line of both counties to Kale Water, on the south-east of Roxburgh, they consist of a series of parallel ridges and longitudinal valleys, intersected by streams, the whole forming a semicircle.* All the waters north of the Tweed run into that river in a south-easterly direction, while all the waters south of it, with the exception of the Liddal, which flows southward, run towards the Tweed in a north-easterly direction. Tweed is thus the only outlet for the drainage

* One topographical feature of Berwickshire is worthy of notice. The valley of the Merse forms a great basin, having its lowest point about Coldstream, which is some 14 miles from the sea, and from whence there is a great rising of the land towards the seaboard, with the exception only of the narrow gorge through which the Tweed finds its outlet. The Leet Water, for instance, flowing from near Whitsome to Coldstream, has a south-westerly course from the sea inwards. The Till river also, in Northumberland, has a similar course, and falls into the Tweed near Coldstream. The bed of the Whittadder, 6 miles from the sea, is higher than the bed of the Tweed at Kelso, which is 24 miles inland. It is to the basin-like form of the district that its original waterlogged condition was due, and for which it obtained its name *Merse*—that is, *Marsh*.—ED.

of both counties, and forms the boundary between Berwick and Northumberland: the dip of both counties as well as the course of the rivers is towards the east. As already stated, the mountain-ranges are chiefly at the extremities of the counties. There are a few isolated and lofty peaked hills in the interior, such as the Dunian, Ruberslaw, Penulheugh, and the Eildons. From these eminences extensive and picturesque views are obtained of the richly cultivated valleys and sinuously flowing streams of central Roxburgh. From the three pointed Eildons especially, the prospect is charming, and commands all the vale of lower Teviot and the course of the Tweed, from where it enters the county at the world-famous Abbotsford, to where it discharges its waters into the sea at Berwick. Without, indeed, the aid of an eminence to view it, the vale of Tweed is singularly beautiful—fields gently undulating to the river on either side, and mapped out with all the regularity of garden parterres, and fringed with highly ornamented trees. Here the Tweed, flowing through grassy banks that gently slope to the cultivated soil, or are separated from it by rows of umbrageous trees; there, hemmed in by woodland banks, or bounded on one side by mural rock, which refuses any further denudation, and skirting on its way the ruins of Dryburgh Abbey, Roxburgh and Norham Castles; the princely seat of Fleurs Castle, which, for situation, noble trees, and lovely lawns, has no rival. Makerston, Lees, Ladykirk, &c., all present a combination of cultivated and natural scenery, not surpassed in any district in Scotland. The views, too, from Layerslaw, Cockburnlaw, and particularly from Harden's Hill, are very imposing. The windings of the Blackadder and Whittadder, luxuriant fields of different hues from grain, grass, and fallow, farm-steadings easily defined by bulky barnyards, and towering chimney-stalks, and attendant cottages, form an attractive scene. The low-lying lands of the counties are all undulating, so that the beds of streams are pure and pebbly, and their flow somewhat rapid. The mean annual fall of rain, as taken at Makerston near Kelso, for nine years, is 24.18. This may also be regarded as the average amount of rain-fall in Berwick. Towards the west of Roxburgh the mean fall is much above that named; and in the absence of any meteorological observations in Liddesdale, the annual fall of rain there may be safely computed at above 35 inches.

SOILS.

Both counties have a great diversity of soils. These consist of clay, loam, sand, peat, and I add as distinguished from all of these, friable mould. In general, each description of soil is in considerable patches, and less broken than in many counties. There are, doubtless, farms which consist of every variety of soil named, but these are exceptional, and one kind of soil generally extends over large tracts of land.

Clay prevails in the Merse, where it is very retentive. It is, however, of a fertile character, which is at once apparent from its black colour. It has here also a considerable surface depth, and is much more productive than the Roxburgh clays. The abundance of silica diffused through the alumina, gives bone or strength to its straw crops; hence it is that matured cereal crops generally present a singularly level appearance, and are seldom lodged. This clay is, however, difficult to labour, and requires drainage, lime, dry and deep ploughing, to make it friable. The clay of the west of Roxburgh is of a totally different character. This clay covers a large area, and extends over the whole county from Maxton to Selkirk on the one side, and to Hassendean, near Hawick, on the other. It is of a redder hue than the clay last mentioned, is exceedingly unmanageable, and ought not to be worked in wet weather, and gets very soon hard in dry weather. It is generally shallow, and rests on a tilly subsoil. In an undrained state its produce is not of great value, and it is especially ill adapted for turnip culture. Drains and lime, however, greatly change its character, and subsoiling is essential to render its retentive substratum pervious. The parish of Mertoun, and the west part of Earlston, also consist chiefly of this description of clay.

Loam in its best character prevails on the banks of the Leader to the north of Lauder, of Whittadder, and Blackadder, in Lower Teviotdale, and all along the banks of the Tweed, from Dryburgh to Berwick. It forms, indeed, all the peninsula between Tweed and Teviot, extending from Nisbet on the one, to Rutherford on the other, to the confluence of these rivers, and which peninsula constitutes the most fertile soil in Roxburgh.

Peat, like the mountain-ranges, is most abundant in the outskirts of the counties, and is rarely met with in the interior, with the exception of some patches in the parishes of Gordon and Greenlaw. This soil is chiefly confined to the pastoral districts. Here it partially extends along the southern base of the Lammermuirs, slightly intersperses the Hawick range, and is singularly interstratified with clay in Liddesdale. Deep peat moss is not prevalent, and indeed is only met with between Cumberland and Roxburgh, and at Threipwood in the northern confines of the latter county.

Sand covers a comparatively small area, and is more detached than any other soil. In the valley of Upper Teviot, the soil is partly sand and partly gravel, deposited from the detritus of the upland shingly slopes. In the parish of Westruther there is a considerable portion of black sand, which has the appearance of moss. In the Merse sand of a similar character is to be met with, but the area it covers is not large.

Friable Earth.—This description of soil covers a large area, and is what is generally designated a barley soil. The upland slopes

of Leader, of Ellem, and Rule, are of this character of soil. It is open and porous, and has been abraided from the rock on which it rests, and which often protrudes through it. It has not the consistency of clay, contains little sand, bears no resemblance to moss, as its mineral preponderates over its vegetable matter; and it has not the depth and calcareousness of loam. Resting generally on a vertical stratum, it is naturally dry, and when it is not, it is easily drained.

Peculiar Soils.—Around the base of the porphyritic Eildons the soil is rather peculiar. Its colour is of a brownish red, and, with the exception of the presence of consistent surface clods, and the soil running together in wet, and being easily injured in dry weather, there is nothing unfavourable in its appearance. The evident presence of peroxide of iron, however, is the cause of the comparative infertility of this soil.* Around the Black Hill at Earlston there is a considerable area of soil, which, in colour, is of a deep red, and more fertile than the last named. Its grass produce especially is highly nutritive, which is well evinced by the rapidity with which it fattens sheep and lambs. In its physical character, as well as colour, the soil is identical with the now famous potato-growing soil around Dunbar, and might probably be turned to the same lucrative purpose. In Berwick, a black friable soil, easily mistaken for loam, though less consistent and more sandy, is in small patches frequently met with. It is very infertile, and its cereal crops in dry seasons either do not yield well or hang in the blade, and, therefore, do not properly mature. A heavy pressing, a surface-dressing with clay, and liberal farmyard manuring, counteract the natural defects of this kind of soil.

It is worthy of remark, that the same character of soil is often met with on different rock-formations, and, on the other hand, different soils are found on the same formation. Nowhere is the latter more apparent than the soils on the Liddesdale and Kelso coal-formations. In Liddesdale the land is chiefly uncultivated, and saturated with superfluous moisture, from the water finding no fissures in the tabulated and horizontal formation through which to escape; whereas, on the same formation in Kelso district, the soil is rich and highly cultivated, and the deposit of soil deeper than the former, from a greater denudation of rock.

* Infertility is seldom or never caused by the bright red peroxide of iron. The purple-coloured clays of the Eildons, as well as all the purple-coloured soil of the pastoral lands in the south of Scotland, naturally bear grasses of a fine feeding quality. The fleece of the flocks grazing on such lands is tinged or dyed by the red loam. This is well known to be in general associated with a sound constitution in the flocks. So much is this red bloom on the fleece in repute, that, when naturally wanting, it is not uncommon to imitate it by the use of keel-water on those portions of the stock which are sent to market. The tenacity, however, of the porphyritic clay of the Eildons is considerable. When it is put under cultivation, the crops are often somewhat stunted when the season has been unfavourable for reducing it to a proper tilth. The defects of the soil are chiefly of a physical nature.—ED.

SIMILARITY OF THE TWO COUNTIES.

Although Roxburgh and Berwick in some respects differ, yet, on the whole, no two counties in Scotland could be named which have such a similarity of soil and farming. With respect to minor matters there is doubtless some variance. Roxburgh is more highly favoured than Berwick for markets, has, on the whole, a better turnip soil, its fields are larger, its fences better trimmed, and its land generally requires less labour, and is better adapted for fattening flocks. Berwick, on the other hand, has the best wheat soil, produces the bulkiest crops of beans and the best mangold, has the advantage of being bounded on the east by a maritime coast, and the flocks which depasture its mountains are less liable to disease than the mountain flocks of Roxburgh. The hills in Roxburgh are green and grassy; those in Berwick are black and heathy. Both counties are alike in having various modes of sheep-farming, in having the same system of rotation, in producing the same varieties of crops, in invariably associating tillage and pasture, in adopting the same principles, and using the same forces in husbandry. They agree, too, in each having mountainous tracts and undulating plains, diversified woodlands and verdant slopes,—in fact, in having the same description of farms and the same style of farming.

Bordering on England nearly the whole breadth of the island, and having been for many centuries the scene of many a deadly conflict between the English and Scottish armies, as well as between neighbouring feudal lords, it might be reasonably supposed that Border agriculture should be still lagging in the rear of progress, and still bearing traces of a barbarous age. It is not so, however; for towards the east, where the fiercest wars were waged, the agriculture of north Northumberland is in an advanced state, while that of Roxburgh and Berwick is not unworthy of the high position which Scottish agriculture has attained. It is, therefore, a matter of no little praise to the eastern Border counties that deficient culture has not survived their dilapidated fortresses and crumbling battlements, but around these has sprung up a system of agriculture which could only have been nurtured on their ruins, and which now bears no impress of feudal times.

SIZE AND CHARACTER OF FARMS.

Apart from a few small holdings around towns, the arable farms vary in size from 200 to 1600 acres. The average size is about 450 acres. Although the size of farms has not greatly changed during the last twenty-five years, yet any alterations which have been made in this direction have been to enlarge them. Several instances have occurred where two farms have been put into one, but there is scarcely an instance of one farm having been divided

into two. The fields are generally rectangular, and are enclosed by straight fences, which in low districts consist chiefly of hawthorn hedges, kept clean at the roots, and nicely surloped. In upland districts where stones abound, fences are built of this material, and are usually made 5 feet high. Although not so pleasing to the eye as hedgerows, yet they are in every respect superior; they at once form a fence, they afford excellent shelter, do not harbour birds, and extract no nourishment from the surrounding soil.

The *Steadings* are generally conveniently placed near to the centre of the farms. Modern steadings are very compact, yet commodious, and contain fixed steam-powers, with barn and granaries attached, well ventilated single-stalled stables, with every feeding convenience for hay, boiled and dry food; stalls, boxes, and courts for fattening cattle; boiling and turnip houses, cart-sheds, piggeries, &c. On large farms there are generally a smithy and a saw-mill, the latter driven by steam-power. For the sake of lessening the cartage of grain and manure, there are often two steadings on one farm.

There are no superfluous and few overshadowing trees. Plantations are only around the seats of landowners, and isolated trees are only to be seen at distant intervals along the hedgerows.

Some persons condemn the want of small farms, as thus no stepping-stones are afforded for the peasantry to elevate their condition, and as the want of these is injurious to the wellbeing of a community. In so far as the latter objection is concerned, it does not apply to the border counties, for, on the whole, all classes have been for a series of years prosperous. In the parishes of Eckford and Morebattle, where the majority of the farms are 1000 acres each, a more prosperous tenantry and a more thriving peasantry are nowhere to be found. The pastoral farms vary in size from 600 to 3000 acres; the average size is about 1800 acres. Pastoral farms are chiefly "led" farms, or farms let to non-resident tenants. Tenants of arable farms are generally resident.

SYSTEM OF ROTATION AND HUSBANDRY.*

The general system of farming embraces stock and crop husbandry, and the farmers' attention to, and profits derived from each, are somewhat equally divided. It is the union of these two branches of farming that is the mainspring of the Border farmers' success, and which indeed forms the basis of all advanced and successful farming. In this respect, either of the counties is not equalled by any other county in Scotland; for they excel not only on account of uniting the two branches, but in the efficient manner in which both departments are carried out. It is the union of

* The rental of arable land varies from £1 to £3, 10s.—35s. is about the average rental. For pastoral land the average rental is 6s. 6d. per acre.

stock and crop husbandry that has rendered the system of alternating grass and grain crops advisable, and which furnishes the strongest argument for a regular system of rotation of cropping. Apart from the advantage which accrues from changing crops which feed on different food, some soils require to be under grass for a time to acquire a compactness of texture essential to wheat and clover culture, but these are exceptional, and this want can so far be supplied by mechanical means. For other soils, again, a long course of rotation may be contended for, to prevent the too frequent recurrence of the turnip crop; but this, too, could be obtained without growing grass crops indispensable to the maintenance of stock. On the ground, then, of maintaining stock is the strongest argument furnished for a system of alternate husbandry,—which is the most perfect mode of culture that has yet been devised. It is in carrying out this mode that the Roxburgh and Berwick farmers find the five-course shift the most beneficial, and which is the course they almost universally adopt. On some farms, in close proximity to towns, where there is great demand for straw, roots, and hay, the four-course shift is carried out; but the area of land under this system is comparatively trifling. The five-course rotation generally practised embraces—first, turnips, beans, potatoes, or mangold; second, wheat, barley, or oats; third and fourth, clover and grass; and, fifth, oats. When beans are sown, they generally take the place of turnips after oats, although they sometimes take the place of the second year's seed. Having two years' grass, the five-course provides for the maintenance of stock; and as it has also a proportionate acreage under turnips, so it raises for stock a supply of winter food equal to its supply of summer food. This system of rotation, therefore, combining, as it does, stock with cereal farming, gives to the farmer a means of success from having varied produce, maintains the condition of land at a comparatively small outlay, tends to clean the soil of weeds, and, through the folding of sheep on turnips and the depasturing of cattle, imparts to it a consistency and compactness which it periodically requires. Although contending, however, for the five-course rotation, as the most suitable for Berwick and Roxburgh, the writer would not be understood as approving of any stringent system of cropping, as forming a condition of contract between landlord and tenant. Such conditions are sometimes incompatible with advanced husbandry, as the now ready command of portable manures, and the use of artificial food, render the most severe mode of cropping consistent with good farming. The farmers in Berwick and Roxburgh are generally bound to a five-course; but several of those who have recently entered upon new leases are at liberty to deviate from it. For the sake of distinctness, I shall consider the two departments of farming—crop and stock—separately.

CROP HUSBANDRY.

Wheat is the most valuable cereal crop, and in both counties occupies a prominent place. Adapted to the strong clays of the Merse, and to the land more especially north of the Tweed in Roxburgh, the wheat crops raised, both as regards yield and quality, are not much inferior to those of the best wheat-growing districts in Scotland. According to the agricultural statistics drawn up under the auspices of the Highland Society, the acreage of the two counties under wheat in 1857 was 20,963, and in 1856, 24,464. As regards the extent of acreage under wheat, Berwick ranks as the sixth county in Scotland, while Roxburgh occupies an average place. In respect to the proportional area under wheat, as compared with the total arable area, Berwick also takes the sixth place from the top. According to the same source, the yield of wheat in both countries was, in the years already mentioned, only about average. The preparation of land for wheat varies according to the variety of crop it follows. The acreage of fallow wheat is gradually becoming less, as the system of summer fallowing is happily being rapidly abandoned. The preparing of fallows for wheat is therefore becoming less important. A deep furrow in autumn, and another deep furrow in summer, cleaning, if required —the application of 10 or 12 tons per acre of farmyard manure, followed by a shallow ploughing, and ribbed with a short moulded ribbing-plough—constitute the chief preparation of fallow land for wheat. When wheat succeeds a turnip crop—as is the general practice in the counties under consideration—one furrow of moderate depth, say 6 inches, is regarded as sufficient. In ploughing any description of soil for wheat, ridges, either broad or narrow, should be avoided, and the land ought to be laid down as level as possible without any open furrows. The old system of rounding ridges for wheat, a practice essential in the absence of drainage, is wellnigh abandoned, and a level surface is in growing favour. Unequal ripening, lodged and twisted crops, and the crop for 4 or 5 feet on either side of the furrow, one-half deficient to that in the centre of the ridge, are the cognate evils of round ridges. Wheat after fallow or potatoes is generally sown in October, and after turnips, in all the intervening months from October till April. Many farmers do not sow wheat in the end of November, considering that it is better to delay sowing until the end of February, as frosts are injurious to the seed, as well as to the newly-germinated plant. The mode of sowing is sometimes broadcast with the hand, and sometimes with the sowing-machine, which is useful for grass seeds; and although either the one mode or the other is frequently adopted for wheat, yet crops are bulkier when sown broadcast on land as left by the plough furrow. Mr Hardie of Harrietfield, one of the most

advanced and intelligent farmers in Roxburgh, informed the writer, that for his cereal crops he only uses the drill when he anticipates too much straw, as it is more favourable for grass seeds, inasmuch as it not only tends to prevent crops from lodging, but when they do lodge, they are not so closely laid to the ground. Apart from lodging, however, the broadcast system is considered the best. The quantity of seed given per acre is from 2 to 3 bushels, but varies according to the time of sowing. The varieties of wheat most in use are Hunter's Fenton, Lammas red, bearded, &c.; the latter, however, in recent years, has not yielded well, and in many farms barley is now sown instead. Mr Bruce of Easter Langlee, an extensive and successful grower of wheat, uses the following varieties:—Creeping wheat on cold land, Hunter's on warm and fertile soil, and April wheat on land not adapted for barley. Mr Murray of Kersknowe, also an extensive and successful grower, sows Hunter's variety on his best land, and Northumberland red on his inferior land. In the Merse, the red varieties are most approved of.

Barley is the next cereal that claims attention. In both counties this grain holds a prominent position. In the county of Berwick, in 1857, it occupied an area of 15,298 acres; in Roxburgh, 12,107 acres. With respect to acreage under this crop, Berwick is the fourth, and Roxburgh the sixth county in Scotland. The quality is generally very superior. The Kelso and Berwick basins, the banks of the Whittadder and Blackadder, the vales of Teviot and Leader, all yield excellent samples of barley. Wherever the soil is of a loamy character, or dry and compact in texture, barley is successfully produced. The variety generally used, and in growing favour, is the common or Scotch barley. Chevalier commands the highest price; but as it is deficient in yield, and about ten days later than the common varieties—Scotch and Bell's—thereby involving greater loss from weather, it should never be grown in other than the earliest districts. It is a question, whether on the majority of soils barley is not a more profitable crop than wheat. Doubtless barley is less liable to disease, and grasses are more valuable after it than after wheat. The aptness of barley to lodge, however, thereby injuring its quality, has been long a drawback to its cultivation. For the purpose of preventing this evil, early sowing has recently been adopted with most favourable results. Many farmers now sow their barley seed before oats, and thus, by producing less luxuriance of straw, not only prevent barley crops from lodging, but produce a finer and heavier sample. The old practice of allowing barley land two ploughings before seeding it is now all but abandoned, and one light furrow is adopted. To prevent lodging, too, barley is on some farms sown with the drill-machine, but by far the greater area is sown broadcast. It is generally sown after

potatoes and turnips, although of late years several farmers have tried it after lea. The yield from the latter mode is deficient, but the quality of grain is superior. Unlike wheat, barley succeeds best when the surface soil is not much trodden; therefore much harrowing ought to be avoided. The quantity of seed sown per acre is from 2 to 3½ bushels. Last season, a farmer in the neighbourhood of Kelso seeded a field consisting of a fine loamy soil with only a bushel per acre, and the result was one of the bulkiest crops obtained in the district. Barley, however, ought to be close in the ground, as the sample is seldom fine when the crop is thinly planted. The manurial condition, as well as the natural fertility of a soil, are, however, important points with respect to the proper quantity of seed to use.

Oats.—The oat crop, as might be supposed, occupies a larger area than any of the cereals. In Berwick, in the year 1857, there were 30,444 acres; in Roxburgh, 28,428—so that both counties have a greater acreage of oats than that of wheat and barley combined. The quality is generally superior; the potato oat especially, which is extensively grown in Kelso district and in the west of Berwickshire, is not surpassed, if equalled, for quality, in any district. The varieties generally sown are potato, sandy, Sherriff, Blainslie, early and late Angus. The *potato oat* is generally sown on low-lying fertile soil. It is easily shaken, affords a poor sample if not equally ripened, and is easily injured by the grubworm. Sandy is sown on light sharp soils and in exposed situations; and Blainslie, late Angus, or some other common varieties, on cold thin clays. The Sherriff variety yields well, but the quality of grain, as well as straw, is very inferior. Recently this variety has not been extensively sown. The sandy oat occupies the largest area in both counties. Its yield is not equal to some other varieties, but it is a great favourite with the miller; and considering that it is comparatively early, not easily injured by winds or protracted rains, has the best straw, and leaves the cleanest stubble, it is on the whole the most profitable oat. In 1858, Mr Arras, Ormiston, introduced into Roxburgh an oat called the Canadian oat. He tried it alongside of the potato oat, and sowed both in the same field and on the same day. The Canadian variety was cut on the 31st July, and the potato on the 13th August; both crops were good. Since then, however, the Canadian oat has not succeeded so well; and although it is still earlier than any other variety, the yield is deficient. Oats occupy almost the whole area after lea, and are generally sown in all upland districts after turnips.

MODE OF HARVESTING.

Cereal crops are now generally cut, rather a few days before, than a few days after they are fully ripe. So soon as wheat

assumes a golden hue, barley drops the ear, and oats retain only a discernible shade of green, they are ready for the reaper. Exceptions, however, must be made in the case of sandy oats, which require to have lost their green hue at least ten days before they are ready for cutting, or otherwise they are alike deficient in yield and weight. In the low-lying districts of Roxburgh and Berwick harvest is early, and in ordinary seasons is general about the 12th of August. Some of the farms in the neighbourhood of Coldstream and Swinton, the Nisbets and Ormiston on the Teviot, and Fens, Mosstower, and Ednam on the Tweed, are as early as the earliest farms in the earliest districts of Scotland.

The *Mode of Harvesting* grain is that generally adopted throughout Scotland. On one farm is used the sickle, on another the scythe, and on a third the reaping-machine. Binding the grain, so soon as cut, into well-balanced and not too tightly tied sheaves, and placing ten sheaves into unhooded shocks, carrying the shocks when dry into the barn-yard, and building them into circularly-formed stacks, which usually turn out 15 qrs. of grain, embrace the more prominent harvest operations. A considerable breadth is still cut with the sickle, and will continue to be so, as twisted or lodged grain cannot be so well taken up by any other method. Reaping with the sickle is chiefly executed by Irish, who, in great numbers, still come to the Border counties to harvest, and who are singularly expert in the use of the reaping-hook. Seldom, therefore, does delay in reaping occur from a short supply of hands. In 1858, on one of the largest farms in Roxburghshire, 400 acres of grain fell before hand-reapers in the short time of eight days. When able hands are secured and well stewarded, reaping with the sickle does not, even on the ground of economy, bear an unfavourable comparison with any other mode. I have known the grain crop on a large farm cut with the hook at 5s. per acre—the wages the reapers received being 12s. per week, with victuals. The scythe has also a great many advocates, and is also considerably used. It makes good work on standing oats, but, like the reaping-machine, is of little use when the grain is lodged. It is seldom used on the barley or wheat crops. The reaping-machine is now used on a great many farms; indeed, it is not uncommon to see two or more reapers on one farm. As the horse labour with the reaper need scarcely be taken into account, as horses are usually idle at the commencement of harvest, so, therefore, on the whole, reaping by machinery is the most economical mode, where it is practicable to adopt it. The crops are never allowed to be in swathe, but are always bound and placed in shocks when cut. The first-named mode, though still adopted in the warm and dry southern counties of England, is, for Scotland, very objectionable. The placing of stacks on iron frames is now general, and proves beneficial in protecting the grain from vermin, as well as for im-

proving its condition. In high and late districts, farmers put a kiln or boss in stacks, made of three strong posts, placed 3 feet wide at the bottom and tapering to the top, and usually 10 feet high. The points of the posts are allowed to cross each other about 2 feet from the top, to support the stack above it. It is the best mode of keeping ill-conditioned grain that has yet been devised, as it affords a free circulation of air in the centre of the stack, prevents the upper part of the stack from pressing heavily on the lower part, and by keeping up the tops of the sheaves, prevents them from sustaining any injury from "dipping."

LEGUMINOUS CROPS.

Beans do not occupy a prominent place in either county. The Merse clays are well adapted for beans, and produce very bulky crops. This crop generally succeeds oats, and is seldom taken after lea. The narrow drill, or 16 inches between the rows, has recently been successfully adopted, instead of the wide drill of 27 inches. Land for beans is manured in autumn, with 20 cartloads of farmyard manure. Pease, though under 1000 acres in both counties, yet either of them has a much larger area under this crop than any other county. This may be partly ascribed to the great demand for grey pease to make peasemeal bannocks—the favourite food of the peasantry of the eastern Borders—and partly because some of the dry soils and sunny slopes of the Border counties are singularly well adapted for pease. On shaley or splintery soils, in early situations, pease are sometimes taken instead of turnips. When pease are successfully grown they leave a clean stubble. They are now generally sown with the drill-machine. Beans and pease are stacked in the oblong form. Winter tares or vetches are rarely sown. In both counties there is a large acreage under spring tares, which are partly used for horses in summer, and chiefly as autumn food for fattening cattle.

RAPE.

Next to Dumfries, Berwick grows the largest area of rape, and Roxburgh follows as the third rape-producing county. Rape is sown in July, after lea, and after the summer flush of grass is over, so that two crops are thus obtained in one summer. It leaves the land also in excellent condition for wheat, which usually succeeds it. It is eaten in the months of September and October, by fattening sheep and sometimes by breeding ewes—by the latter for inducing early lambs and twins.

ROOT CROPS.

Turnips occupy the most prominent place among root crops. The importance of this crop, as essential in a rotation to clean

and recover exhausted soils, to manure land for several succeeding crops, as the best media through which nitrogeneous food is transmitted from the atmosphere to the soil, and as the best food for either fattening or store stock, is fully appreciated by the Border farmers. Roxburgh has the largest proportional acreage, and Berwick next, under this crop; both counties having under turnips about one-fifth part of their total acreage under a rotation of crops. This fact of itself is perhaps the highest eulogium that can be paid to the agriculture of the counties; for, as a general rule, turnip culture and its usual attendant—sheep-husbandry—form the basis of the highest farming. Nor is it only with respect to acreage that they excel in turnips; it may safely be affirmed, that for efficient turnip culture and yield of roots per acre the county of Roxburgh is not surpassed by any county in Scotland,—the same is applicable to several districts of Berwick; but, on the whole, the latter county, from having a larger area of retentive clays, is not so well adapted for the culture of turnips as Roxburgh. The western districts of the latter county may also be excluded from that high position as regards successful turnip cultivation applicable to it generally, for the thin and tilly clays which extend over part of the parishes of Ancrum and Maxton, and over nearly all of those of St Boswells, Bowden, Minto, and Lilliesleaf, are not favourable for the production of root crops. With the exception, however, of these clay districts of both counties, high turnip cultivation is exhibited in the weedless and finely reduced fallows and highly manured fields, in the ridges skilfully drawn, careful hand and horse hoeings, and in a luxuriance of shaw that affords no place for vacant ground, which everywhere prevail. This advanced state of turnip husbandry is only worthy of those counties into which drill or ridge culture was first introduced, and which had for several years a large area of turnips under that mode before other counties followed their example. The system of preparing land for turnips has during the last fifteen years greatly changed. Formerly several ploughings in spring were regarded as essential; now on many farms spring-ploughing is abandoned, and surface cultivators, grubbers, and scarifiers adopted. Greater attention is also given to the autumn furrow now than formerly, and one deep furrow in autumn when the soil is dry is regarded as worth ten ploughings in spring, and is half of the preparatory labour for the turnip crop performed. The use of surface cultivators in spring secures two requirements essential to successful turnip culture—a fine surface tilth, and a sufficient degree of moisture in the soil to braird turnips; by frequent ploughings in dry weather the latter is totally dissipated, and an unequal braird, if not a useless crop, is the result. By surface tillage the moisture has no means of escape, as there is no inversion of soil; so also the use of surface cultivators for

securing, or rather for preserving, a fine surface tilth. No compact furrows or unyielding clods are by these brought to the surface, but a finely-reduced soil, as left by the action of the winter's frosts, is prepared for the reception of the seed. When land is dirty, and when farmyard manure is applied in the drill, there is not a sufficient depth of surface tilth to earth up a ridge without a ploughing in spring; spring ploughing, however, should be avoided where circumstances permit. Where ploughing is adopted, this operation is generally immediately followed by harrowing, and this again by rolling. When the land is allowed to lie a few days after either having been ploughed or grubbed, it ought to be left in a rolled state, to prevent the dissipating of moisture. Some farmers object to this, on the ground that it not only prevents the destruction of couch-grass in dry weather, but fosters its growth. Rolling has no doubt this tendency, but the advantages it secures preponderate over the disadvantages, and the presence of couch-grass is not compatible with high farming. Part of farmyard manure is applied in autumn, but by far the largest proportion is applied in the drill. Many farmers adopt manuring in autumn to expedite turnip-sowing, but few, apart from this advantage, approve of it. Thus, Mr Wilson, Edington Mains, Mr Hardie of Harrietfield, Mr Usher, Stodrig, Mr Logan, Woodend—all celebrated turnip-growers—manure chiefly in the drill. Apart from the waste from filtration consequent on autumn manuring, unquestionably the turnip succeeds best where farmyard manure is within the immediate reach of its roots. This is best secured by manuring in the drill, and a less quantity of manure is thus required, as it is all available. The writer, from repeated trials, has found that manure in the drill produces a bulkier crop of turnips than when applied in autumn, and the difference in favour of the former is especially remarkable with swedes. There are doubtless circumstances which render autumn manuring imperative, such as when a farmer has a larger area under turnips than forces to work it, steep land which the operation of applying manure in spring destroys, and light open soils, on which manure, if not well prepared, operates injuriously in the drill. Autumn manuring in almost all such cases is adopted in both counties. It is the general practice for farmers to apply farmyard manure to the whole of their turnip "break," and thus they leave no portion of land solely dependant on artificial manure. The rank cereal crops produced, and the free use of artificial foods, enable them to carry this out. Some farmers pursue a system of keeping a year's manure beforehand, while others use all up to what is made within two months from the time that it is applied. The latter is the most prevalent mode, and the former is chiefly adopted where autumn manuring is carried out. There is an evident waste in retaining farmyard manure over the summer months unless it is kept

under cover, and as manure made from rich food is in a green state equally as valuable as in an old, the using up of the manure is the preferable mode. Last season a Roxburghshire farmer tried a new experiment with turnips. The field he experimented upon consists of a fine loamy soil, clean, and in high condition. Last autumn he ploughed, harrowed, &c., the field, formed the drills, manured in the drill, and closed them ; in fact, performed in autumn all the usual spring operations for turnip culture up to seeding. The land was left in drill all winter. In May the drills were slightly harrowed down ; guano applied to the tops of drills, after which the drills were again earthed up with the plough, and the seed sown. The surface tilth was remarkably fine, and the result is an excellent crop of turnips. Manure, when applied in the drill, should not be allowed to waste from evaporation, but covered up as soon as spread. This is best attained when either some ploughs are employed to form ridges, and others speedily to close them, or when all the ploughs follow each other, forming the ridges the one way, and closing them the other. The double mouldboard plough is generally used for ridging, although some farmers, for lightness of draught, use the common plough. On imperfectly reduced soils the latter implement is preferable to the other, as it does not collect so many clods into the centre of the ridge. Drilling 27 inches apart, seeding with 5 lb. of Swedish seed per acre, and 2 lb. of the common varieties, leaving the plants ten inches apart in the rows, frequent horse-hoeings, and sometimes a light plough-paring, are, apart from artificial manuring, the chief operations necessary to raise a turnip crop. The quantity of farmyard manure applied in the drill is from 15 to 20 cart-loads. Artificial manure is sown with the hand on the top of the latter ; and among a great variety of manures now used, a mixture of superphosphates and Peruvian guano is the favourite, and withal the most successful manure ; three-fifths of superphosphates, and two-fifths of Peruvian guano, are the usual proportions. For swedes, Peruvian guano alone, with twenty cart-loads of well-prepared farmyard dung, is the best manure. The varieties of turnips generally sown are of the Swedish—Skirving's and Marshall's ; of the common—yellow bullock, green top, and white globe. The proportional acreage under swedes has, within the last ten years, greatly increased. White globe is the variety to use first, as it is the best to begin hoggs upon ; and when it can be preserved until spring, it is best for lambing ewes. The storing of turnips is an important matter. Those farmers who store them for spring use for cattle, usually pull by the end of November, while yet full of sap, and put them into oblong pits, or into large square heaps three feet deep. The latter mode is the best, as it exposes less upright surface to the horizontal sweep of frosty winds. A thick covering of straw, with only as much earth as to keep it firm, is all that is required. The writer has seen two

hundred cart-loads stored in this way in one heap, and when uncovered in spring, they were as sound and nutritious as when newly stored. Rain falling on a flat and unprotected surface in this form does no injury to the turnips, and a sufficient depth of straw to protect them from frosts is the primary consideration. The greater the quantity put together in the square form the better, provided the depth is limited, as there is thereby less exposure of a perpendicular surface. For spring use for sheep they are sometimes stored in pits over the field, and sometimes earthed up by the plough in the drill where they grow. A plan adopted in some of the English counties of forming a deep furrow every third drill, and pulling three drills, and putting tops, bulbs, and roots, unseparated, into the furrow, and covering them as deep with earth as the plough can perform, seems worthy of wider adoption.

Mangold.—The small acreage Roxburgh produces is not worth noticing. Berwick ranks along with Haddington, as next to Ayr and Wigton, though far short of the area of these mangold-producing counties. This reveals a singular anomaly, as the two eastern counties have nothing in common with the western counties. In fact the nature of the respective soils is quite different, while the much greater quantity of rain which falls on the west coast, renders the respective climates dissimilar. Depth of soil is probably an explanation of the seeming anomaly. Crops, however, are not grown solely for adaptability to soils, but their extent, influenced by other circumstances. Mangolds, for example, are an essential adjunct to dairy farming or the soiling of cattle, and generally when these are most carried out, there are mangolds most grown. Berwick, on the whole, produces excellent mangold, and several fields of this root which the writer witnessed in the Merse this season, could not be far short of forty tons per acre.

Potatoes, as might be anticipated, from the extensive area that is allotted to the turnip crop, do not take a prominent place in the husbandry of Roxburgh and Berwick. On the contrary, Roxburgh has the least proportionate acreage of any of the Scottish counties under this crop, and Berwick next. The potato is consequently grown more for domestic use than for sale. The growth of this crop, however, for sale, has been steadily increasing of late. Orkney reds and some of the coarser varieties of whites, are the varieties chiefly planted. American earlies, and Prince Regents, though they command a higher price, yet from their deficiency of haulms not affording a sufficient covering to the soil, they are not so profitable for a succeeding crop as the luxuriant haulmed varieties. An intelligent farmer lately told the writer that he had a quarter of barley to the acre less after early than after red potatoes; the writer has witnessed similar results.

Of Carrots, Cabbage, Bere, Rye, Flax, &c., the area under each and all is so small in both counties, that they belong more to a horticultural than an agricultural "paper."

ARTIFICIAL GRASSES.

Having two crops—first and second years—under grass, it consequently extends over about the double of the area of any other crop. Both years' grass in both counties is chiefly used for pasture. On the majority of the farms a small field of the first year's grass is annually cut for spring food for horses, but with the exception of some heavy clay farms in the Merse and Lilliesleaf parish, generally little artificial hay is cut for sale. Of late years great improvements have been effected in the mode of sowing grasses. Machine has been substituted for hand sowing, light for heavy harrows. A finer surface tilth previous to the sowing of seeds, and a firmer compression of the soil after, have all tended to improve artificial pastures. Seeds are generally sown after land is rolled, for the purpose of securing for them an equal depth of soil harrowed in with light harrows, and the sowing operations completed with a second rolling. The following mixtures of seeds adopted by well-known agriculturists, show the prevailing custom of different districts in the counties. Mr Wilson, Edington Mains, allows for the field he annually sows for mowing red clover and Italian ryegrass only,—for pasture 14 lb. of mixed clover, consisting of white and alsike clovers, trefoil and a little parsley, the proportions being often varied according to soil, and half bushel perennial ryegrass per acre. Mr Usher, Stoding, generally sows for pasture 12 lb. yellow clover, 4 lb. red, and 4 lb. white, with only about two-thirds of a bushel of annual ryegrass. Mr Craw, Whitsomehill, for pasture sows 6 lb. of white clover, 4 lb. yellow, 2 lb. alsyke, 2 lb. rib-grass, and from three-fourths to 1 bushel of perennial ryegrass. Mr Bruce, Easter Langlee, sows 4 lb. of white clover, 4 lb. of yellow, 3 lb. of cow grass, or perennial red clover, and a little alsike. Mr Allan, Billiemains, sows two-thirds of a bushel of perennial ryegrass and Italian mixed, 2 lb. of alsike clover, 4 lb. of white, and 4 lb. of cow grass. Mr Mills, Greenend, St Boswells, uses per acre 4 lb. of yellow clover, 4 lb. of white, 4 lb. cow grass, and 2 lb. of alsike. Mr Mills substitutes cow grass for red clover, because his land is "tired" of the latter. Mr Hardie, Harrietfield, Kelso, sows 6 lb. of white clover, 4 lb. of yellow, 4 lb. of red, and 1 lb. of perennial ryegrass. The latter gentleman has, by accurate experiment, ascertained that, upon his farm, alsike clover is the latest clover in spring, and will not feed so many sheep per acre as white or red clovers. On the whole, alsike clover is most successful in high situations. The same gentleman has also tried Cock's foot grass, but did not find it equal as pasture to perennial ryegrass. Perhaps the greatest drawback to the use of such natural grasses as crested dogs-tail grass, *Dactylus glomerata*, &c., is the risk of seeding land with couch-grass, &c., as these varieties are difficult to obtain free of spurious seeds. From an analysis by Dr Voelcker, it appears that crested dogs-tail grass is

one of the most valuable varieties, and this is borne out by the experience of one of the most intelligent practical farmers in Berwickshire, who annually sows a quarter of a bushel per acre of this variety for pasture, and who for several years has realised the highest price for his lambs. Mr Usher says, that although Italian ryegrass is still largely grown by some farmers in Kelso district, yet it is rather getting out of favour, as it is injurious to clovers. The writer has ascertained that this is the case throughout both counties generally. For soiling cattle, and for yielding several cuttings, Italian is the best variety of grass; but this shall be afterwards referred to.

Summer fallowing demands a passing notice. In Roxburgh the system is all but abandoned. In Berwick there is still a considerable area under fallow, but it is rapidly diminishing. Some of the most intelligent farmers still contend that it is the most profitable mode to adopt on cold, tenacious clays, and that better crops of wheat and clover are thus obtained. Doubtless, soils difficult to reduce, and which yield a poor crop of turnips, ought to be fallowed, as they are, under existing circumstances, not adapted for root crops. It is the physical condition of these soils, however, that operates injuriously to turnip culture, and this can be greatly changed by efficient management, such as draining and liming.

IMPLEMENTS OF HUSBANDRY.

In this department there have not been many new introductions, but chiefly improvements effected on old inventions. The farmers of either county have not been carried away by a mania for possessing new and often comparatively worthless implements. The implements in general use embrace the common swing, paring trench, and subsoil ploughs. The short-bodied cart for ordinary farm purposes, and the long cart without attached or removable frames—for hay and the in-gathering of crops, fallow-grubbers, heavy and light, and drill-grubbers of various kinds, harrows, common brake and Norwegian, grass and grain broadcast sowing machines, self-feeding turnip sowing machines, wooden and iron rollers or clod-crushers, turnip-cutters, and guano-crushers, corn and cake bruisers, attached to fixed thrashing-machines driven by steam power, and, as formerly mentioned, drill and reaping machines, &c., &c. A trial was made of the steam plough this season (1861) on the farm of Edington Mains, and those who witnessed it were satisfied with the work. Unquestionably, if the use of the steam plough is in any case practicable or profitable, it must be on deep clay soils, and in large square fields, such as prevail in the Merse of Berwickshire. Apart from the Merse, however, and the Vales of Teviot and Tweed, the greater portion of land is, from its shallow nature, and from hav-

ing often protruding rock, not adapted for steam cultivation, so that if the success of future agriculture depends on steam cultivation, as some predict, many border farmers are fated to remain stationary. The common malleable iron swing plough is in most use, and is made to take a rectangular furrow of uniform depth.

Depth of furrow is generally regulated by the nature of the soil and the time of ploughing. The autumn furrow for fallow is ploughed from 10 to 12 inches deep, lea from 6 to 8 inches, and land, after turnips, about 6 inches. Grass-seed machines, which sow a breadth of 16 feet, are universal, and machines for sowing grain are now also considerably used. An implement lately invented by Mr Thomson, engineer, Stow, has, during the last two years, been introduced into the west part of Roxburghshire, and promises to become useful. A grass-seed machine is attached to an ordinary sized roller, and covers the same breadth, and is so attached that the grass seed may either be deposited before or after the roller. The operations of seeding and rolling are thus completed at once. Heavy clod-crushers are rather getting out of use. Farmers have learned from experience that there is nothing so injurious to land as the use of weighty implements for although these may make a finely-reduced surface soil, yet they render the soil, a few inches below the surface, firm and compact, and, in fact, undo former labours. The use of such implements may indeed be taken as a test of bad farming, for drains and lime are the best means for reducing any variety of soil, and the means good farmers generally employ to accomplish this end.* The grubber was introduced into Roxburgh about the year 1841, and, as already noticed, has proved a most useful implement for surface tillage. The turnip cutter too—Gardner's and others—has proved a great boon to the farmer, both as regards the economising of food and inducing the rapid fattening of stock. The lessening of manual labour consequent on the introduction of cake and guano-crushers, &c., &c. are well known.

STOCK HUSBANDRY

embraces several important branches of Border agriculture. The solely pastoral farming is confined to the Cheviot and Lammermuir ranges, the lofty peaked fells of Upper Teviot, and the Liddlesdale Hills. This kind of farming has undergone little change for a long period, save that the area under it has greatly diminished, and is rapidly diminishing. The breeds

* It would certainly indicate good management on the part of clay-land farmers to be able to dispense entirely with heavy clod-crushers. These are no doubt less used for pulverising the land than was wont to be the case. Drainage has greatly assisted by rendering the land sooner and better suited for the plough, while the action of the atmosphere completes the pulverising. On most farms, however, heavy rollers and clod-crushers are found at times to be invaluable implements.—ED.

of *sheep* in the pastoral districts are *blackfaced* and *Cheviot*. Though there are a few flocks of the former in Liddesdale, yet this breed is now almost solely confined to the Lammermuirs. Crossing this breed with Cheviot or Leicester male sheep is very general, and as has long been the custom of those who adopt crossing, ewe lambs are bought at West Linton market for breeding ewes. Lambs produced from blackfaced ewes and Leicester rams fatten with amazing rapidity; and some of those reared on the pastoral hills on the south-east of the Lammermuir range are not surpassed by the best-fattened lambs in lowland situations. The Cheviot breed still prevails on its native mountains, the Cheviot hills—and is also the chief breed in Liddesdale, Teviotdale, and on the Lammermuirs. With the exception of Dumfries, Roxburgh is not equalled for a superior breed of Cheviots by any county; and the fact that in it are reared and grazed the flocks of the three most renowned breeders of Cheviots,—Mr Aitchison of Linhope, Mr Elliot of Hindhope, and Mr Brydon of Moodlaw—some of the flocks of the latter gentleman being grazed on the south-western confines of the county—proves its pre-eminence in this breed of sheep. In the absence of statistics it is difficult to form a close estimate of the comparative numbers of blackfaced and Cheviot sheep in the counties, but these may be roughly estimated as six Cheviots for one blackfaced. Occupying the highest hills, the blackfaced breed, as improvements advance, is diminishing; indeed all upland improvements tend to make the Cheviot breed supplant the blackfaced; and, again, the half Leicesters supplant the Cheviot, and the full-bred Leicester goes on extending its range. This is well illustrated in the change of stock exhibited at the great lamb fairs of St Boswells and Melrose. Formerly, at the first-named fair, Cheviots were exhibited in great numbers; now, not a Cheviot lamb is shown. Formerly, at Melrose Fair, some lots of blackfaced were shown, and the number of Cheviots far exceeded that of half-breds. Now, no blackfaced lambs are exhibited, and the show of half-breds far exceed that of Cheviots. The only improvements effected on pastoral ranges are surface liming and closed drains, and these have been carried out on a very limited scale. Where they have been carried out, however, they have greatly improved the pastures. Artificial shelter is still almost unknown, and mountain flocks have no shelter save that afforded by the conformation of the hills. Hill shelter seems to be more needed now than formerly, for the recent introduction of a larger breed of Cheviots—not an improvement—which are soft, and not fitted to endure the severity of winter, will only tend to profit when associated with increased care. Ascending the scale of better-fed flocks, *the Cheviot flock, with half-bred lambs*, next demands notice. Here we leave the wholly pastoral and come to the partly arable and partly pastoral farm. Of late years

this description of farming has greatly increased, and it prevails in all upland districts where land has been recently reclaimed. Some of the lowest-lying farms of Lammermuir, those in Lauderdale, and in the parishes of Ashkirk, Kirton, Bedrule, and Morebattle, belong to this class. The management of pastoral land is doubtless distinct from that of arable, but when both are on the same farm, the one is farmed so as to suit the other. This is indeed imperative where Cheviot ewes are crossed with Leicester rams, as half-bred lambs are only successfully reared where the mothers get turnip food in spring, and the lambs, along with the mothers, get a few hours' run over sown grasses in summer. The arable and pastoral land are thus made a mutual benefit, the crops of the former improving and providing for a greater number of sheep; and the sheep, on the other hand, imparting fertility to the arable land, and this is generally a very successful mode of farming. Apart from these advantages, sheep which get sown along with old pastures are less liable to disease, such as "loupin' ill," which is prevalent on the Border hills. One drawback to half-bred lambs is, that secondary ewe lambs can only be obtained to maintain the breeding flock, but the extra prices realised for half-bred lambs more than compensate for this drawback.

Still higher in the scale of improvement, and more valuable, are, *half-bred flocks, with three parts bred lambs.* These are kept on lower lying and wholly arable farms. Compared with Cheviot ewes, half-breds require higher *keep* and better shelter, and yield more mutton and wool. They are also more prolific; and it is not rare for flocks to yield two-thirds of twins. The lambs are eagerly sought for by hogg-feeders, as they fatten much sooner than half-breds.

The last and best variety of breeding sheep are pure bred *Leicesters.* These are kept as regular stock by a great many farmers in the Kelso district, as well as in the low lands of Berwickshire, for breeding rams. This system sprung up within the last twenty years; and so rapid has been its progress and so marked its success, that at the annual tup show and auction sales held at Kelso in September, the show of Leicester rams is not equalled for numbers and quality at any fair or auction sales in Scotland. The average show is about two thousand, and breeders from all parts of Scotland, Ireland, and the north of England, are attracted to purchase. Fifty pounds are frequently given for a superior ram, and some large lots average upwards of £13. The well-known names of Lord Polwarth, Mr Cockburn, late of Sisterpath; Messrs Stark, Mellenden; Simson, Blainslie; Simson, Courthill; Hardie, Harrietfield; Purves, Burnfoot; and many others who might be named, stand high as breeders of this class of sheep. Considerable discussion has recently taken place concerning the true Leicester or Dishley breed, some contending that the sheep

of Kelso district are pure Leicesters; while others contend that the smaller-boned sheep south of the Tweed are the true descendants of the Dishley breed. Both parties are probably correct; and the difference of form now manifested by the so-called different breeds is not greater than might be supposed between two off-shoots of the same breed, having been differently treated in different climates. As it is, the Kelso farmers ought to stick to the breed of sheep they have adopted, as they yield more wool, and have larger frames than the other off-shoot from Dishley; and their aptitude to fatten is borne out by the unequalled rapidity with which they are matured for the market. And this brings under notice a most important branch of farming lately sprung up also—viz. the fattening of hoggs (one-year-old sheep); and here also, in this branch of farming, Berwick and Roxburgh take the foremost position. Farms best suited for this mode of farming are those which have a dry soil, and an undulating, southernly exposure. Some farmers fatten the produce they breed; others who have no breeding stock purchase lambs at St Boswells and Melrose fairs. The lambs are kept on hay or stubble foggage till the end of October, when they are folded on white globe turnips for about six weeks. They are then put on cut turnips, and get a little cake and oats, and are frequently ready for the butcher by the end of April. Of late years several farmers have by the beginning of May realised 50s. per head for hoggs out of the wool. It may here be remarked, that for the proper distribution of their excrements, and for allowing the land equal trampling, it is essential to shift hoggs, getting cut turnips every day. In concluding these cursory statements regarding the breeds of sheep in the counties, the writer has pleasure in recording that the Leicester breed of sheep in the counties of Roxburgh and Berwick is not equalled in any county in Scotland; that the Cheviot breed in Roxburgh is not surpassed in any other county; and that both counties, apart from quality, maintain a greater number of sheep in proportion to their total acreage, than any two other counties in Scotland.

Cattle.—Concurrent with sheep husbandry in lowland districts is that of cattle. This department, too, occupies a prominent place in both counties, and they both stand high, especially in the department of fattening cattle. Dairy farming there is none save that only which is necessary to supply domestic wants. Nor does the Border farmer boast of owning a long-pedigreed breed of cattle, such as are only kept to swell the successful lists of the National Show, although in this department, too, Messrs Dickenson, Magdalenhall; Milne of Faldonside; Wilson of Cumledge; Simson, Blainslie; and Brodie, Clarilaw,—are well known as successful exhibitors at local as well as at the Highland Society's Exhibitions. The majority of the Border farmers judge, and judge truly, that high and profitable farming is more fitly, and certainly more

frequently, associated with luxuriant crops and weedless fields, than with the mere ownership of cattle, which any one with capital may possess, if he chooses to purchase, and which withal often owe their success to over-feeding. The breed of cattle, however, as short-horns, are equal, if they do not surpass, any other county; but they are generally kept more for profit than fancy. Each farmer keeps as many cows as support so many calves, as half the number of cattle he usually fattens, so that his annual cast of fattened cattle are half of them bred on the farm, and half bought in. This accounts for the comparatively small number of cattle in the counties as given by the Highland Society's returns. These returns were drawn up prior to the time the Border farmers purchase cattle to fatten, which is generally in September; and these cattle are chiefly bred in other counties, and bought at Newcastle, Falkirk, Jedburgh, and Kelso fairs.

The different modes of fattening—in stalls, boxes, and in courts—are all practised; but the latter mode is the most prevalent. I give the practices of a few well-known fatteners of cattle, whose produce often swells the number of the first-class cattle exhibited at Newcastle and Smithfield Christmas Shows:—Dr Murray of Kersknowe, Kelso, who annually fattens from seventy to ninety cattle rising three and four year old; feeds almost entirely on white globe till nearly the 1st of January; after that time, on cut swedes; finishing off with from 4 to 6 lb. of oil-cake for the last six weeks—time of fattening, five or six months. Mr Mills, Greenend, St Boswells, feeds part in courts and part in boxes, but prefers the latter, and allows 4 lb. of oil-cake the last three months. Mr Wilson, Edington Mains, also feeds partly in boxes and partly in courts; puts in his cattle to fatten about the 1st of October, giving about 1 cwt. of globe turnip daily to each bullock at two feeds. He also gives each beast a mash twice a-day, which consists of chopped straw moistened with a gruel which is cooked in an open kettle. The gruel is made by boiling ground rape-cake and meal of any kind of grain which happens to be cheapest at the time. The weight of cake and meal Mr Wilson allows to his cattle is usually about 3 lb. per bullock per diem, and the allowance is increased as the animal approaches marketable fatness. Mr Hardie, Harrietfield, one of the best cattle-fatteners in Scotland, and who frequently gives from £20 to £30 for cattle to put in to fatten, feeds part in boxes and part in courts. Mr Hardie generally depastures about forty cattle—about half the number he usually fattens—on old grass, and allows them a little cake for a month before they are put in to fatten. He commences with white globe, which he continues for a month, and after allows cut swedes. From the time the cattle are put in to the time they are sold, the quantity of cake allowed increases from 2 to 6 lb. This year Mr Hardie had some remarkably fine year-old sucklings; they could not be short of 50 imperial stones. Mr Bruce, Easter

Langlee, feeds annually about fifty cattle in courts which hold five cattle; in the courts are covered eating-troughs. Mr Bruce prefers courts to boxes when the climate is good, as cattle always look better out of courts than out of boxes. Mr Bruce allows for each beast during the period of fattening about 3 cwt. of mixed corn and cake.

From few farms having a field of rich old pasture there are very few cattle fattened off grass. The want of such fields, adapted as they are for yielding food in all seasons, and for every variety of stock, is probably the greatest defect in the farming of Roxburgh and Berwick. Nor is the soiling of cattle much practised, although a very few farmers carry it out very successfully. Apart from other considerations, the valuable manure obtained from the soiling of cattle is a strong argument in favour of this mode. On the other hand, the artificial feeding in open fields, so far as manurial benefit is concerned, is not so well saved as the excrements from cattle in an open field in summer, being partly carried away by evaporation. The following successful results from liquid manuring and soiling were obtained last season (1860) on the home farm of Milnegraden. The gross produce was Italian rye grass—the yield of a field of 7 acres.

		Expenditure.	Returns.
Ploughing 7 acres, at 10s. per acre,		£3 10 0	
Sowing, harrowing, and rolling,		2 2 0	
21 Bushels seed, at 6s. 6d. per bushel,		6 16 6	
7 cwt. Peruvian guano, at 13s. 6d.,		4 14 6	
219 tons liquid manure, not charged,		0 0 0	
Cost of 1st cutting, £4, 7s. 4½d.	Coal for engine, 3 days,	0 9 4½	
	Engineer, 3 days, at 3s. per day,	0 9 0	
	Working horse, 3 days, at 3s. per day,	0 9 9	
	Cutting and carting home grass,	3 0 0	

1st. Cutting 82 tons 7 cwt., consumed as under—

		Tons.	Cwt.		Expenditure.	Returns.
From 23d June to 21st July.	10 West Highland Cattle,	41	10			
	44 Sheep,	23	2			
	8 Horses,	12	15	at 2d. per st.		£17 0 0
	6 Cows,	5	0	do.		6 13 4
	Total cosumed,	82	7			

2d. Cutting 104 tons 7 cwt., consumed as under—

		Tons.	Cwt.		Expenditure.	Returns.
From 21st July to 25th August.	26 Cattle,*	83	10			
	44 Sheep,	11	15			
	8 Horses,	7	7			9 16 0
	6 Cows,	1	15			2 6 8
	Total consumed,	104	7			
	Carry forward,				£21 11 1½	£35 16 0

* On 18th July, 16 cross-bred bullocks were added to the foregoing 10 West Highlanders.

	Tons.	Cwt.	Expenditure.	Returns.
Brought forward, .			£21 11 1½	£35 16 0
3d. Cutting 59 tons 13 cwt., consumed as under—				
From 15th Sept. to 13th October. 16 Cattle, .	54	0		
8 Horses, .	5	13		7 10 8
Total consumed, .	59	13		
4th. Crops consumed on ground as under—				
46 Sheep for 3 weeks, at 6d. each per week,				3 9 0
Rent of the above 7 acres,			14 0 0	
Poor Rates,			0 10 6	
Cost of 2d and 3d cuttings,			8 14 9	
10 West Highland bullocks put into feeding byre, 18th June, cost £14, sold 31st August for £18, 10s., leaving a profit of				45 0 0
16 Cross-bred bullocks put into feeding byre 18th July, cost £13 each, valued 13th October at £18, leaving a profit of				80 0 0
44 Sheep 10 weeks in pens, cost 27s., sold at 34s., leaving a profit of				15 8 0
			£44 15 7½	£187 3 8
Deduct expenses, .				44 15 7½
Nett profit, .				£142 8 0½

For this detailed account the writer is indebted to Mr Bardner, manager of the farm. The yield of grass appears to be extraordinary, but it ought to be remembered that Italian or any grass is very weighty when newly mown.* The nett profit from 7 acres is also extraordinary, and could have been obtained by no other means than by the soiling of cattle. Liquid manuring and soiling to be successful must be associated, for the one is as closely connected with the other as seed-time and harvest. On grasses alone is liquid manure of any use, for to apply it to cereal crops it is generally injurious, and where it is not, the soil must be exceedingly poor and badly managed.

The high and increasing prices of beef during the last season added considerably to the profits derived from cattle, and consequently increased the nett profit derived from liquid manuring. For the liquid manure nothing is charged, nor is any charge made for steamed rape-cake—of which the fattening cattle, in addition to grass, got each 4 lb. per day—as 4 tons of valuable solid excre-

* It might have been quite as satisfactory just to have given the gross weight of the grass which the 7 acres produced. This statement shows a very successful instance of feeding stock, but an estimated and an actual value make up the total returns. The grass given to horses and cows is valued at too high a figure—much higher than it yielded in soiling cattle, or in consuming it with sheep upon the ground.—ED.

ments obtained daily therefrom are more than an equivalent for the actual value of the cake and the man's wages who attended the cattle. If interest on outlay for tanks, pipes, and machinery had been charged in the expenditure column, as ought to have been done, the sum shown in the account as nett profit would have been widely different. For example, supposing that £500 of capital had been invested for machinery, and 7 acres the total area on the farm to which liquid manure had been applied, £92—allowing 10 per cent on the capital expended—instead of £142, would have been the actual profit obtained. It must be borne in mind, however, that machinery for the distribution of liquid manure over 70 acres does not involve much more expenditure than machinery for 7 acres; therefore the absence of interest being charged in the foregoing account does not greatly detract from the favourable results it shows of liquid manuring and of soiling cattle.*

By soiling, &c., sixty bullocks are annually fattened on this small farm of 176 acres.

Horses are bred chiefly for agricultural work, not for sale. They are partly of Clydesdale, and partly of English breed, and partly a cross between these breeds. On farms in Roxburgh, where the five-course rotation is practised, a pair of horses are allowed for 100 acres; in Berwick, 80 acres are sufficient for a yoke of horses, or, in other words, a farm of 600 acres in Roxburgh require six regular pairs of horses, and a pair for "odd work;" while a farm of the same size in Berwick requires an additional pair. Nor is it probable that any change in the mode of agriculture will require a greater number of horses to work the same extent of land. Improved cultivation by no means increases horse labour, for after a farm is well drained and limed, it does not require much labour. True, an increased production consequent on improved farming requires extra work; but so far as horse labour is concerned, this is limited merely to extra cartage of grain crops, and manure, and is more than compensated for by the other cognate result of higher farming, less and lighter tillage. The old practice of grazing horses in open fields during summer is still general, although not commendable. Horses, in warm weather, are better in the stable; while a great saving is effected by feeding them on cut grass.

In *Swine* neither of the counties takes a prominent place. Nearly all of them are kept for home use.

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* The actual value of the rape-cake given to the cattle may here be stated :—

10 West Highland cattle at 4 lb. each, daily (69 days), £5, 15s.
16 Cross-bred bullocks, „ (87 days), 11, 12s.

The sheep, during the last six weeks, received each ½ lb. of Indian corn, the cost of which was—44 (sheep) × 42 × ½ lb. at 1d. per lb. = £3, 15s. 4d.

If these sums are to be deducted from the gross returns, some value would require to be put on the manure obtained from the cattle and sheep.

Markets for fat stock—sheep and cattle—are only held at Kelso and Berwick. St Boswells is the principal fair for both counties for Leicester and half-bred lambs, and so also Melrose, the largest lamb fair in Scotland, for half-breds and Cheviots. The principal fairs for draught ewes are held at Kelso and Melrose; for store cattle, Jedburgh and Kelso; and for Cheviot tups, Hawick; and horses, Kelso. These fairs are all in the county of Roxburgh, and, strange to say, the county of Berwick has no fair of great importance. Dunse fairs for ewes and lambs, and Earlstone for cattle, are gradually declining. There is evidently wanted in the south of Scotland a market for cattle such as Falkirk market is for the north. St Boswells or Melrose would be central places for the Roxburgh, Berwick, and East Lothian fatteners of cattle to meet the Cumberland and West country graziers.

MEANS WHICH HAVE CONTRIBUTED TO AGRICULTURAL PROGRESS.

After the outline given in the foregoing pages of the stock and crop farming of the two counties, it is now necessary to glance at some of the agents or means which have so greatly contributed to the recent progress of the agriculture of the Borders; and foremost among these is Smith's system of *parallel drainage*. Previous to the introduction of this system, crude notions and practices prevailed regarding drainage. Even on steep acclivities—often met with in Berwick and Roxburgh—drains were regarded as rightly placed only when put as direct across the slope as to allow as little fall as possible. The result was that only 2 or 3 feet of land below the drains were dried, so that this method was actually spending money without receiving any reward. The mode of cutting the drains wide at the bottom and filling them near the surface with stones, was fitted to obstruct the current of any drains, however properly placed. Some idea of the views entertained regarding drainage up to the beginning of the present century may be formed, when Dr Douglas, one of the most advanced agriculturists of that time, thus wrote: "I understand several judicious farmers think drains should be covered with a less depth of soil than 8 or 10 inches, that they may be more easily opened by the plough to let away surface water." Widely different was the system introduced by Smith. He discovered that parallel drains, 20 to 30 feet apart, varying according to soil, and from 2 to 3 feet deep, could only effectually dry land. At first farmers were slow to adopt his system; but those who ventured on a trial of it were soon led to carry it out as far as their means would permit. Since the labours of Parkes, drains have been cut deeper than Smith advocated. With regard to depth of drains, deeper cultivation will doubtless give greater facilities for the extension of the roots of plants, and therefore necessitate deeper drains. There are, however, it appears to us, soils, such as are shallow and rest on a poor till or worthless sub-

soil, that deep cultivation would injure, and on which to cut drains 4 feet deep were to throw money needlessly away. It was not, however, till the Government drainage grant was given in 1845 that drainage was carried out on a gigantic scale in the two counties. Landowners and farmers already cognisant of drainage being the basis of every agricultural improvement, alike eagerly sought the Government money—the former merely accepting the money and becoming security for the outlay, and the latter readily paying the required interest. Never was there a more judicious loan, or one from which accrued so many benefits. Landowners, in some cases, had their estates greatly increased in value without any outlay, and farmers, through paying a little interest, became occupants of a workable soil and producers of luxuriant crops, labourers needed not to seek for labour, and all classes of the community became sharers in an increased production of food. The writer can furnish no reliable data as to the amount of Government money expended in Berwick and Roxburgh; but this must be great, as £50,000 was spent alone in the western division of the last-named county. Subsequent to, if not concurrent with, the Government loan, a fresh impulse was given to landowners and farmers to expend on drainage their private capital. Hence, in both counties, very large sums have been expended, both by landlords and tenants, to which reference will again be made.

The introduction of *Guano*, too, has had a marked influence on agriculture. It was first introduced into the counties under consideration in 1841, and was then sold at £18 per ton. The extraordinary results obtained from a very small quantity applied, either to grain or green crops, soon commanded for it general favour, and it was soon extensively used. The extra turnip-crops which it produced increased the productiveness of all other crops in a rotation, and the general results were an immense increase in the value of all crops; nor was it only on the arable area that guano produced beneficial results; it gave a fresh impulse for the conversion of upland slopes, formerly unavailable for turnip culture, from being inaccessible to farmyard manure. Bones had, no doubt, been in use for several years; but as the supply of this manure was limited, its application to land was limited also. Moreover, previous to Liebig's discovery of dissolving bones, they were of no use on the Merse clays—in fact, the use of them was money thrown away. The introduction of guano and superphosphate has, therefore, proved an immense boon to clay farms, and has partly tended to reduce the area under summer fallow. The quantity of guano, superphosphates, bone-dust, and other manures now used in the counties is very great, and probably annually amounts to £150,000. As a general rule guano is more used than any other manure, and more especially on the majority of Merse clay soils, a mixture of Peruvian guano and bone dust pro-

duces the most satisfactory results. On light poor soils a liberal application of bones produces a good crop of turnips, and increases the fertility of the soil. Several farmers prepare bones for use themselves, and succeed. Mr Bruce, Easter Langlee, prepares bones with gypsum in a natural state, and mixes and ferments them with the urine of cattle, three months previous to application. The average quantity of artificials applied to turnips is from 3 to 6 cwt., varying according to the value of the manure. £2, 5s. per acre may thus be taken as the average amount expended on artificials for the turnip crop. Of late years less artificial manure has been applied to cereal crops than formerly—in fact, this is now chiefly confined to crops which have a stunted appearance in spring, or to wheats on inferior conditioned land. This is, doubtless, a step in the right direction, as land well farmed, under an alternating system of cereal and grass husbandry, and the turnip crop well manured, requires no application of extraneous manures. On such land artificial manure is injurious, as *it*, by forcing a too rapid growth, produces succulent stems, and the crops prematurely lodge. The increased consumption of artificial food has also tended to preclude the necessity of applying any artificial manure to other than the turnip crop. The farmyard manure is thus greatly improved, and liberal application of it impregnates every particle of soil with those elements of fertility essential to produce luxuriant cereal crops. With greater attention to the proper management and preparation of farmyard manure a larger consumption of artificial food, and with a continuation of the present system of stock-farming, it is not probable that the consumption of artificial manures will increase in the Border counties.

The introduction of railway communication into both counties, has also tended to develop their agricultural resources. Cheaper artificial foods and manures, higher prices for native products, and increased facilities for obtaining street manure, and lime, and tiles, and commodities for domestic use, are some of the fruits of railway accommodation. Roxburgh is now singularly well favoured with railways, but Berwick still requires a line of railway through the vale of Leader, or through the centre of the Lammermuir range. Were the latter carried out, some of the heath-clad mountains of the Lammermuirs would be converted into rich fields of luxuriant pastures.

Local Agricultural Societies, too, have had an influence in advancing agriculture. Of these, the East of Berwickshire Agricultural Society, and Kelso Farmers' Clubs, have contributed their quota. The east of Berwickshire, a few years ago, took a very prominent and praiseworthy part in aiding the cause of agriculture. Recently this society has been dissolved, and the Hawick or Teviotdale Farmers' Club is now taking the lead in

both counties as regards the discussing of important and practical subjects.

The Highland Society, too, has nobly done its part in contributing to the cause of agriculture. Apart from its annual gatherings, the important questions it brings before the public in the shape of prize essays, and the encouragement it gives to local ploughing societies, have in part for their fruits the well-managed farms and luxuriant crops of Roxburgh and Berwick. Nor need the writer allude to the aid which agriculture has received from the analysis of manures and artificial foods, and the proper mode of conducting field experiments, from the Highland Society's chemist, Dr Anderson; these, if not acknowledged by the farmer, doubtless influence his returns.

LANDOWNERS' IMPROVEMENTS,

now, as hitherto, embrace the erection of new, or the repairing of old, homesteads, cottages, drainage, laying down of plantations, fences for new inclosures, &c. As a general rule, however, one and all of these, with the exception of planting, are executed partly with the assistance of the tenant. Of late years a great number of excellent and commodious steadings have been erected on several estates, some of which have been erected at a cost of £4000. Edington Mains, Boon, Haymount, may be named from among many others recently erected of a similar character, as singularly commodious steadings. The steading of Simprim Mains, a farm of 430 acres, has been highly approved of. It is a combination of open and covered feeding-places for cattle, and contains all that is requisite for an arable farm of the size specified, and the cost has been only £1200. It is generally a condition of contracts for the tenants to drive carriages or pay so much percentage on the total outlay. Buildings made during the currency of a lease, without having been contracted for, are at the cost of the proprietor—the tenant driving the carriages. Cottages are generally erected under similar conditions. Of late a great improvement has taken place in this direction. On the majority of estates the cottages are either all new, or the old have been repaired and enlarged. There was doubtless room for improvement, and even yet, in some districts in the Border counties, these improvements have to be carried out. Cottages recently built have conveniences in every respect suited to the position of those who occupy them. They generally contain a kitchen, room, and two bed-rooms. More accommodation than this to the peasantry would be productive of evil, and involve an amount of expenditure disproportionate to their incomes. With the peasantry, as with every other class, house accommodation should involve an outlay below instead of above their incomes, or otherwise it becomes a grievance, and its alleged advantages are converted into positive evils.

The landlord is generally at the cost of opening drains, the tenant either furnishing the tiles and closing them, or filling them with stones. In other cases, the tenant is charged a percentage on the total outlay, and again in others the tenant is at the sole expense. Trimming and cleaning hedgerows are sometimes executed at the mutual expense of landlord and tenant; but, generally, the latter performs these at his own expense.

TENANTS' IMPROVEMENTS.

The following farms, in the best-farmed districts, are chiefly noticed to show the general character of the farming in different districts:—Leaving the town of Kelso by the north road, the large farm-house and steading of Harrietfield farm, about one and a half mile distant from the town, at once from its elevated situation attracts the eye. On entering the farm lands, the well-trimmed hedgerows and handsome and well-hung gates demand attention. In keeping with these are the well-kept approaches to, and lawns surrounding, the farm-house, which augur well for a highly-farmed farm. Being, during the summer season when the writer visited this farm, the cattle-boxes and courts—which annually in spring turn out from sixty to eighty of the best-fattened cattle in Roxburgh and Berwick—were empty, but they nevertheless evinced careful supervision. No manure wasting from evaporation, or from surface-sewers carrying off its liquid, filled the courts, but these and all they contained were cleaned as carefully as the best-kept farm kitchen. And so also the other offices. No straw or mud was visible in the approaches to stable or byre, but everywhere carefully kept; and ploughs, carts, and all implements of husbandry, well arranged in their proper places. Leaving the steading for the even more inviting fields, the first enclosure entered, which was in the first year's grass, well deserved inspection. Its thickly-planted and dark-hued clover and grasses, its level and furrowless surface, and the entire absence of couch-grass, bore evidence of superior management. Nor were the sheep which depastured the field less attractive: these consisted of pure Leicester shearlings, intended for the great ram sale at Kelso. Their large frames, abundance of wool and evident aptitude to fatten from their high condition, warranted them first-class sheep. All the cereal crops on the farm—wheat, oats, and barley, were singularly equal and quite above average, and no docks, thistles, or weeds of any description, were to be seen among the grain. One field of oats only was cut, the stubble of which was the cleanest the writer ever witnessed. The turnip crop, too, with the exception of a small portion of headlands, was exceedingly equal, and promised to be above average. Forty cattle, intended for fattening during winter, and lately purchased, were browsing on a field of old pasture; they were high-class cattle, and worth

from £20 to £25 each. On a neighbouring field of two years' old grass was a large flock of Leicester ewes—some of them mothers of the shearling rams. The farm contains 600 acres of arable land, and is partly in Roxburgh and partly in Berwick. The soil is only of medium quality, but the use of a large quantity of artificial foods and manures have rendered it productive, and each department, green and grain crops, sheep and cattle, is in keeping with one another, and all skilfully managed.

In the same district, and in a somewhat elevated situation, is a first-class managed clay farm of about 700 acres. The change which this farm has undergone since the commencement of the present lease in 1854 is remarkable. Open boundary ditches have been filled up, irregular fences made straight, vacant ground occupied, and stiff cold clays rendered warm and friable. The luxuriant crops of every description on this farm this season conspicuously evinced the change. A field of young grasses, sown down without a crop, was remarkably luxuriant, and maintained an immense number of stock. Besides having driven carriages for an excellent steading, the present tenant has expended on drainage £4040, exclusive of putting a tile in and filling up all the open ditches; £5076 on lime, and has expended annually from £300 to £400 on artificial manures. The whole of these sums were paid out of the tenant's pocket, with the exception of an abatement of £200 allowed on rent per annum for five years. Besides all the farm manure being applied, which is a very large quantity, from a great number of cattle being annually fattened, the tenant of this farm paid for artificial manures this year £323, and in addition used 800 cart loads of town dung.

Mr Bruce entered the farm of Easter Langlee in 1853. This farm contains nearly 600 acres, chiefly of a clay soil. During the first four summers of the lease the tenant, at his own expense, and with his own horses, laid on the farm 4800 tons of lime; 20,000 roods of drains were executed in five years. Two-thirds of these were filled to the depth of 15 inches with stones, and one-third with tiles. The results of these respective modes prove, what has elsewhere often been proved, that drains well executed with stones operate as efficiently, and preserve an unimpeded current longer than tiles. Mr Bruce produces extraordinary crops of wheat; and indeed is very successful with all his crops.

The farm of Woodend, Dunse, is a singular—it might be said unprecedented—example of expeditious improvements. The farm contains 900 arable acres, and the soil is chiefly of a loamy character. The fields vary from 20 to 60 acres, and are well laid out with straight fences. The farm is exceedingly well managed, and for turnip culture especially the tenant, Mr Logan, is not surpassed. Mr Logan entered on a new lease of the farm at Whitsuntide

1859, little more than two years since. During the first year he limed *seven hundred acres,* at a total cost of £3500. In the same year he drained 600 acres—the drains 3 feet deep and 30 feet apart, at a cost of £2520. Simultaneously with these operations Mr Logan was engaged in driving carriages for two steadings, which cost the proprietor £1000. Mr Logan intends to complete the whole drainage and liming of the farm this season.

On a farm in Berwickshire, which contains upwards of 800 acres, the following system is practised by one of the most systematic and successful farmers. The farm is partly lowland and partly upland, and these divisions are farmed under different systems. The lowland is farmed under the six-course rotation; and the system of cropping pursued is,—

First Year—*Turnips,* manured with 18 tons of farmyard manure, 2 cwt. of Peruvian guano, and the same weight of dissolved bones. One half of the turnip crop is carted to the homestead to be consumed by cattle, the other half is eaten on the ground by sheep.

Second Year—*Wheat* or *Barley,* principally the latter.

Third Year—*Grass,* which is sown down with the preceding crop, and is chiefly eaten by sheep, which also consume a considerable quantity of oil-cake.

Fourth Year—*Oats,* without manure.

Fifth Year—*Beans* and *Potatoes.* The latter are manured the same as the turnips; the beans are not manured, as manuring produces too much straw.

Sixth Year—*Wheat,* sown in autumn, and manured both after the bean and potato crops with 16 cart loads of farm dung per acre.

The upland is farmed under the five-course system—viz.:

First Year—*Turnips.* If swedes, treated the same way as the turnip crop in the six-course; if white or yellow turnips, they are manured with 12 cartloads of farmyard dung, 1½ cwt. of Peruvian guano, and 1½ cwt. of dissolved bones. When no farmyard manure is applied, 2½ cwt. Peruvian guano, and the same weight of dissolved bones, are used. About one-third of the crop is pulled for cattle, and the remainder consumed on the ground by sheep.

Second Year—*Barley;* third and fourth years, grass, pastured with sheep; fifth year, oats. A field of the first year's grass is generally taken for soiling and for hay. This field of grass receives a top-dressing in April of 2 cwt. of Peruvian guano and nitrate of soda, mixed, per acre. This application is sometimes repeated after the first crop, to ensure a good second cutting. This field, the fourth or following year, is planted with potatoes, which crop is followed by wheat.

The horses on this farm are soiled in courts or stables. The quantity of artificial manure annually used is 20 ton of Peruvian guano, 16 ton of dissolved bones, and 4 ton of nitrate of

soda, which in value average from £400 to £500. The number of cattle annually fattened is 100. Part of them in summer are grazed and part of them soiled. Those soiled consume from 3 lb. to 4 lb. of cake daily. Those fattened in winter are fed on cut turnips, small potatoes, bean-meal, oil-cake, &c. The quantity of artificial food annually used is from 20 to 30 ton of oil-cake, and from 300 to 800 bushels of beans. Three hundred breeding ewes are kept, and about 800 hoggs and shearling wedders are annually fattened on this farm.

But time would fail me to tell of the inimitable farming at Coldstream Mains; the high class clay-farming at Greenend and Broomdykes; the advanced modes of husbandry practised at Edington Mains by Mr Wilson, a practised farmer and a polished writer; Cumledge, Spylaw, Stodrig, and Eccles Newton; the clean and tidy farming at Fens, Kersmains, and Ednam; the garden farming at the Nesbitts; and the systematic and exemplary mode of husbandry carried out at Timpendean, Birkenside, Grizzlefield, Legerwood, and many others equally worthy of notice. On these farms there are commodious homesteads; abundant crops; large, square, and weedless fields; finely pulverised and highly-manured fallows; and, what constitutes the highest farming, the largest possible returns associated with the most judicious expenditure.

The name of Mr Scott, late of Timpendean, must not be omitted in this paper; for whether as regards the extent to which Mr Scott farmed, his rapid success as a farmer, and the stimulus which his well-ordered mode of husbandry imparted to others, there have been few, if any, farmers who have done so much to advance Border agriculture. From the humble position of a farm-servant, Mr Scott, by great energy of purpose, unwearied industry, singular shrewdness, skilful direction of labour, and the strictest economy concerning all matters, whether business or domestic, raised himself to that of the largest arable farmer in Scotland. Having at the age of thirty-one saved a little money, Mr Scott leased, in 1817, the farm of Harrietsfield, which extends to nearly 300 acres, and which at that time was in a state of nature, and covered with heath and furze. Mr Scott, with great energy, entered on the process of reclamation, and by drainage, liming, and efficient tillage, soon became the occupant of an excellent arable farm. Through the improvements which Mr Scott effected on the farm of Harrietsfield, it has recently been let at a rise of 100 per cent. In 1832 Mr Scott took the farm of Timpendean, and in 1839 the farm of Broombaulks, and in 1842 the farm of Newton. In 1844 Mr Scott bought the estate of Samieston, extending to about 600 acres, for which he paid £9000. In 1846 Mr Scott took the farm of Whitton; in 1853 he took the extensive pastoral farm of Chatto, and the large arable farm of Frogden. With the exception of Harrietsfield,

Mr Scott held all the farms named at the period of his decease in 1853. These farms maintain upwards of 7000 half Leicester sheep, and employ upwards of 60 work horses, and extend to nearly 8000 acres, of which upwards of 3000 are arable. Of the latter Mr Scott had reclaimed from upland pastures upwards of 1000 acres. Rental of these farms £5200.

It may be mentioned that the sons of Mr Scott are carrying out their father's system. Since his death they have taken four additional farms, and are now reclaiming a large area of land. They now hold upwards of 10,000 acres, which carry 10,000 sheep, and employ 80 work-horses; rental £8000.

Concurrent with the improvements recently effected on the arable land, a very large extent of pastoral upland has been added to the arable area. During the last fifteen years, probably not less than 50,000 acres have been reclaimed.* On the plain moorland between Greenlaw and Earlston, a very large tract of land has been, by Messrs Henderson and others, brought under cultivation with profitable results. Further to the north than this, on the farms of Blyth, &c., a large area of land has been reclaimed. In the parishes of Kirkton, Oxenam, Hownam, Cavers, and Bedrule, the arable area has been greatly increased during the last twenty-five years. But the greatest extent of land that has been reclaimed under adverse circumstances, is in Ellwand Water, in the parish of Melrose. In this small water there are altogether eight farms, whose total extent is about 5000 acres. Previous to the last thirty years the whole district, with the exception of one farm, the half of which was under cultivation, and each farm having two or three small cultivated fields, was a plain, bleak, and comparatively barren moor, yielding here stunted heaths, and there juniper bushes, and again rank rushes and sprett, which carried inferior Cheviot sheep. The land of the district generally presented a singularly unequal surface, from the number of coarse greywacke conglomerates with which it abounded, while its impervious subsoil, causing a humid surface, generated cold and deleterious vapours. Mr Hogg, late of Glendearg, was the first farmer who, with unwearied industry, and almost Herculean energy, entered on the reclaiming of this barren district. Glendearg, the farm he occupied, was the most adverse to reclaim; and part of it being cold clay, incumbent on moorish subsoil, was not the most promising. Mr Hogg, however, commenced in earnest, and proved equal to accomplish what he had undertaken. The plough in many cases was of little use, and

* On the large farm of Fernington 600 acres have been successfully reclaimed, there having been 750 acres arable at the commencement of the current lease, and now there are nearly 1350. The outlay of the present tenant, Mr Munro, on the reclaimed land, has been £4300. In addition to that sum, £1500 of Government money has been expended on drains.

served only to remove the thick surface matting of grass-roots which concealed the stones, which, close as pavement, lay packed beneath. These stones were removed by handpicks and crowbars to the depth of 10 inches, which left a clear furrow for the next ploughing. The expense of this operation alone was very great, as frequently four or five men were employed to pick and pinch out the stones after one plough. Happily the stones proved useful, and a ready outlet was furnished for them in the closely-placed drains the land required, and the stone-dyke fences of 5 feet high which were erected around fields varying from thirty to seventy acres each. But for this two-fold object for which the stones were applied, the cartage of them from off the land would have incurred no little amount of labour and expense. Drainage and removing of the stones were, therefore, simultaneous operations, and followed ploughing and trenching. These completed, from eight to ten tons of lime was applied per acre, and several harrowings, and a ploughing in autumn, completed the preparatory operations necessary to put the land in proper condition to be seeded with oats the following spring. One field was thus reclaimed after another till all the farm, which contains upwards of 600 acres, was cultivated, with the exception of an upland enclosure. During Mr Hogg's occupancy of the farm, he put upon it 5000 tons of lime, and 50,000 roods of drains. The drains were cut 3 feet deep, and filled with 16 inches deep of broken stones, which were closely packed at the top. The cutting of the drains was at the expense of the proprietor, filling and covering in by the tenant. From the abundance of organic matter in the soil —the remains of rank though worthless herbage—the action of lime and drainage produced extraordinary results. The crops of turnips, oats, and barley, as well as grasses, which the farm produced for the first two rotations, have never, so far as bulk is concerned, been surpassed in the county of Roxburgh. On the neighbouring farm of Colmslie—famous in ancient times as the dairy of the monks of Melrose—similar improvements have been, and are being, carried out. Here, too, the presence of innumerable large stones renders the conversion of the land from a state of nature, a very expensive and laborious undertaking, and can only be accomplished by the union of such industry, perseverance, and energy as the present tenant of the farm has brought to bear on it. Happily this toil and industry is being rewarded in the abundant crops which the newly-reclaimed land is yielding. The difference between reclaimed and unreclaimed land was never more conspicuous than on this farm during the present season. On one side of a lately built stone-dyke were a large lot of sheep depasturing on luxuriant white, red, and alsike clovers, redolent with fragrance from their fully-expanded blossoms. On the other side, sterile heaths and worthless sprett prevailed. The adjoining farm of Colmsliehill was of the same rough uninviting character, and was partly reclaimed when

in the possession of the proprietor, and partly during the occupancy of the present tenant. This farm, during the last thirty years, has been converted from a pastoral into an arable farm of upwards of 400 acres. More recently has the farm of Langshaw undergone similar changes, on which has been brought under cultivation a large area of land. Without noticing other farms in the district, let it suffice to say, that the four farms named are now large arable holdings, containing nearly 2000 acres of arable land. This formerly bleak and barren district is now highly cultivated; inferior flocks of Cheviots have been supplanted by those of first-class half-Leicesters; eight pairs of horses have been succeeded by twenty-eight pairs; and the fruits of the change are conspicuously evidenced in the bulky barn-yards, steam thrashing-powers, and in the increased and industrious population.

While according high and deserved merit to farmers in several districts for their energy and enterprise in reclaiming land, it must also be admitted that both counties have yet large tracts of land available for cultivation, but still in a natural state. On the eastern base of the Lammermuirs there are hundreds of acres of pastoral land, which, from being dry and free of stones, is of easy tillage, has a fine exposure, and could be profitably reclaimed. The results of recent operations on the farm of Elmford are ample proofs of the capabilities of the district, and might well stimulate the occupants of neighbouring farms, who occupy equally improvable holdings, to follow the example there shown. In Upper Teviotdale the acres of land available for cultivation might be numbered by thousands. On many of the farms there, such as Falnash, Commonside, the land is naturally dry, slightly undulating, and in fact is peculiarly attractive to the reclaimer of land. No better turnip and barley soil need be wished for than the land of Upper Teviot, which is now only yielding fogged pastures. Liddesdale, too, has yet to be brought under the action of the plough. Here is abundance of lime, and plenty of coal to burn it, and a strong clay-soil, interspersed, no doubt, with patches of moss—everything, indeed, that the most sanguine reclaimer might wish for—yet wide pastoral ranges, and lonely shepherd's cots, attest that the footprints of the reclaimer are in Liddesdale yet unknown. The amount of rain-fall in Liddesdale would doubtless, in some degree, be a barrier to cereal cultivation; but a thorough drainage would mitigate this evil; and as it is, turnip and grasses—crops most luxuriant in a moist climate—are now the most profitable crops to cultivate. With the exception of the extensive tract of deep moss between Roxburgh and Cumberland, and which defies cultivation, a considerable area of cultivable land extends all along the southern and eastern confines of Roxburgh.

[*To be continued.*]

BATTERSEA SHOW, 1862.

AWARD OF PREMIUMS.

Class I.—CATTLE.

POLLED ANGUS OR ABERDEEN.

Judges—John Graham of Shaw, Lockerby; Hugh Watson, The Den of Kinnoul, Perth; W. Smith, Powrie, Dundee.

Section

1. Best Bull calved before 1st January 1860—L.20 to Thomas Lyell, Shielhill, Kirriemuir. Second—L.10 to the Earl of Southesk, Kinnaird Castle, Brechin. Third—The silver medal to said Thomas Lyell. Highly commended—Robert Walker, Portlethen, Aberdeen.
2. Best Bull calved after 1st January 1860—L.20 to James Alexander Pierson, The Guynd, Arbroath. Second—L.10 to Robert F. O. Farquharson of Haughton, Alford. Third—The silver medal to the Earl of Southesk. Highly commended—Alexander Paterson, Mulben, Keith.
3. Best Bull calved after 1st January 1861—L.10 to William M'Combie, Tillyfour, Aberdeen. Second—L.5 to Thomas Lyell, Shielhill, Kirriemuir. Third—The silver medal to the Earl of Southesk.
4. Best Cow of any age—L.10 to William M'Combie, Tillyfour, Aberdeen. Second—L.5 to said William M'Combie. Third—The silver medal to the Earl of Southesk.
5. Best Heifer calved after 1st January 1860—L.10 to said William M'Combie. Second—L.5 to said William M'Combie. Third—The silver medal to the Earl of Southesk. Highly commended—Robert Walker, Portlethen, Aberdeen.
6. Best Heifer calved after 1st January 1861—L.8 to the Earl of Southesk. Second—L.4 to Alexander Paterson, Mulben, Keith. Third—The silver medal to Allan Pollok of Lismany, Ballinasloe.

POLLED GALLOWAY.

Judges—John Graham of Shaw, Lockerby; Hugh Watson, The Den of Kinnoul, Perth; Allan C. Pagan, Innergeldie, Comrie.

7. Best Bull calved before 1st January 1860—L.20 to James Beattie, Newbie House, Annan. Second—L.10 to Joseph Marsland, Glenae, Dumfries. Third—The silver medal to James Graham, Meikle Culloch, Dalbeattie. Highly commended—Patrick Dudgeon of Cargen, Dumfries.
8. Best Bull calved after 1st January 1860—*No Entry.*
9. Best Bull calved after 1st January 1861—L10. to Alexander Jardine, younger of Applegarth, Lockerby. Second—L.5 to Patrick Dudgeon of Cargen, Dumfries. Third—The silver medal—*No Competition.*
10. Best Cow of any age—L.10 to James Beattie, Newbie House, Annan. Second—L.5 to the Duke of Buccleuch, Drumlanrig, Thornhill. Third—The silver medal to the Duke of Buccleuch.
11. Best Heifer calved after 1st January 1860—L.10 to James Graham, Meikle Culloch, Dalbeattie. Second—L.5 to the Duke of Buccleuch. Third—The silver medal to the Duke of Buccleuch. Highly commended—The Duke of Buccleuch.
12. Best Heifer calved after 1st January 1861—L.8 to the Duke of Buccleuch. Second—L.4 to Samuel Thomson, Blaiket, Crocketford, Kirkcudbright. Third—The silver medal to Patrick Dudgeon of Cargen, Dumfries. Highly commended—said Samuel Thomson.

HIGHLAND.

Judges—Richard D. Campbell of Jura; John Macfarlan, Faslane, Helensburgh.

13. Best Bull calved before 1st January 1859—L.20 to John Malcolm of Pol-

talloch, Lochgilphead. Second—L.10 to Allan Pollok, Ronachan, Clachan, Cantire, Argyll. Third—The silver medal to D. Fletcher, Glenards, Tobermory.

14. Best Bull calved after 1st January 1859—L.20 to the Marquis of Breadalbane, Taymouth Castle, Aberfeldy.
15. Best Bull calved after 1st January 1860—L.10 to Robert Anderson, Kildrummie, Nairn.
16. Best Cow of any age—L.10 to John Malcolm of Poltalloch. Second—L.5 to Allan Pollok, Ronachan. Third—The silver medal to Peter Beattie, Dunnydeer, Insch, Aberdeen. Highly commended—Allan Pollok, Ronachan.
17. Best Heifer calved after 1st January 1859—L.10 to the Marquis of Breadalbane, Taymouth Castle. Second—L.5 to the Marquis of Breadalbane. Third—The silver medal to Allan Pollok, Ronachan.
18. Best Heifer calved after 1st January 1860—L.8 to the Marquis of Breadalbane. Second—L.4 to the Marquis of Breadalbane. Third—The silver medal to John Malcolm of Poltalloch, Lochgilphead. Highly commended—John Malcolm of Poltalloch.

AYRSHIRE.

Judges—Patrick Graham Barns of Limekilns, East Kilbride; Robert Guthrie, Crossburn, Troon; James Murdoch, Carntyne, Shettleston.

19. Best Bull calved before 1st January 1860—L.20 to the Duke of Hamilton and Brandon, Hamilton Palace. Second—L.10 to Walter Weir, Barmulloch, Springburn, Glasgow. Third—The silver medal—*withheld.*
20. Best Bull calved after 1st January 1860—L.20 to John Stewart, Burnside Cottage, Strathaven. Second—L.10 to the Duke of Athole, Dunkeld. Third—The silver medal—*No Competition.*
21. Best Bull calved after 1st January 1861—L.10 to John Stewart, Burnside Cottage, Strathaven. Second—L.5 to Alexander Oswald of Auchincruive, Ayr. Third—The silver medal to said John Stewart.
22. Best Cow in Milk of any age—L.10 to the Duke of Athole, Dunkeld. Second—L.5 to the Duke of Hamilton and Brandon, Hamilton Palace. Third—The silver medal to Mrs Wilson, Forehouse, Kilbarchan. Highly commended—The Duke of Athole. Commended—the Duke of Hamilton and Brandon.
23. Best Cow in Calf of any age—L.10 to the Duke of Hamilton and Brandon. Second—L.5 to the Earl of Strathmore, Glammis House. Third—The silver medal to the Earl of Strathmore. Highly commended—Mrs Wilson, Forehouse, Kilbarchan. Commended—David Tweedie, Castle Crawford, Abington.
24. Best Heifer calved after 1st January 1860—L.10 to John Stewart, Burnside Cottage, Strathaven. Second—L.5 to Alexander Oswald of Auchincruive, Ayr. Third—The silver medal to said Alexander Oswald Highly commended—David Tweedie, Castle-Crawford, Abington. Commended—said John Stewart,
25. Best Heifer calved after 1st January 1861—L.8 to said John Stewart. Second—L.4 to said John Stewart. Third—The silver medal to said John Stewart. Highly commended—the Duke of Hamilton and Brandon, Hamilton Palace. Commended—the Earl of Strathmore, Glammis House.

Class II.—CLYDESDALE HORSES.

Judges—Robert Findlay, Springhill, Baillieston; Alexander Renwick, Gairbraid, Maryhill.

Section

1. Best Stallion foaled before 1st January 1859—L.30 to the Duke of Hamilton and Brandon. Second—L.15 to William Kerr, Lochend, Kilbirnie.

Third—The silver medal to William Stirling of Keir, M.P., Dunblane. Highly commended—James M'Artney, Muckart.

2. Best Entire Colt foaled after 1st January 1859—L.20 to Robert Moubray, Cambus, Clackmannan. Second L.10 to David Logan, Netherton, Renfrew. Third—The silver medal to John Hendrie, Kirkwood, Coatbridge. Highly commended—Robert Moubray, Cambus, Clackmannan.
3. Best Mare (with foal at foot) foaled before 1st January 1859—L.20 to John Kerr, Morton, Midcalder. Second—L.10 to James Gray, Blawarthill, Yoker, Glasgow. Third—The silver medal to Colonel Buchanan of Drumpellier, Coatbridge.
4. Best Mare (in foal) foaled before 1st January 1859. L.16 to William Stirling of Keir, M.P., Dunblane. Second—L.8 to the Duke of Hamilton and Brandon. Third—The silver medal to William Stirling of Keir, M.P. Highly commended—said William Stirling. Commended—said William Stirling.
5. Best Filly foaled after 1st January 1859—L.10 to Robert Findlay of Easterhill, Glasgow. Second—L.5 to said Robert Findlay. Third—The silver medal to John Hendrie, Kirkwood, Coatbridge. Highly commended—Allan Pollok, Ronachan, Kyntire.

Class III.—SHEEP.

BLACKFACED.

Judges—John Macfarlan, Faslane, Helensburgh; Robert Paterson of Birthwood, Biggar.

Section

1. Best Tup, not more than four shear—L.10 to Gavin Sandilands, North Cumberhead, Lesmahagow. Second—L.5 to James Drife, Barr, Sanquhar. Third—The silver medal to Robert Elliot, Laighwood, Dunkeld. Highly commended—said James Drife.
2. Best Shearling Tup—L.10 to James Drife, Barr, Sanquhar. Second—L.5 to said James Drife. Third—The silver medal to John Malcolm of Poltalloch, Lochgilphead. Highly commended—said James Drife.
3. Best Five Ewes, not more than four shear—L.8 to Allan Pollok, Ronachan, Clachan, Cantire. Second—L.4 to said James Drife. Third—The silver medal to Samuel Newall of Eastby, Skipton, Yorkshire.
4. Best Five Shearling Ewes—L.8 to said James Drife. Second—L.4 to Alexander Campbell of Auchindarroch, Lochgilphead. Third—The silver medal to Gavin Sandilands, North Cumberhead, Lesmahagow. Highly commended—Robert Elliot, Laighwood, Dunkeld.

CHEVIOT.

Judges—William Aitchison of Linhope, Hawick; Robert Paterson of Birthwood, Biggar.

5. Best Tup, not more than four shear—L.10 to Thomas Brydon, Kinnelhead, Moffat. Second—L.5 to James Brydon, Moodlaw, Langholm. Third—The silver medal to Thomas C. Borthwick, Hopsrig, Langholm. Highly commended—said Thomas C. Borthwick.
6. Best Shearling Tup—L.10 to William G. Hunter, Dumfedling, Langholm. Second—L.5 to Robert Borland, Auchincairn, Closeburn. Third—The silver medal to said William G. Hunter. Highly commended—said Robert Borland.
7. Best Five Ewes, not more than four shear—L.8 to Thomas C. Borthwick, Hopsrig, Langholm. Second—L.4 to the Hon. Colonel Pennant, M.P., Penrhyn Castle, Bangor, Carnarvon.
8. Best Five Shearling Ewes—L.8 to Robert Borland, Auchincairn, Closeburn, Thornhill. Second—L.4 to Thomas C. Borthwick, Hopsrig, Langholm. Third—The silver medal to Sir Graham Graham Montgomery, Bart., M.P., Stobo Castle, Peebles. Highly commended—said Thomas C. Borthwick.

RETURNS OF SEED COMPETITION held at Edinburgh, on the 22d day of October 1861.

Districts.	Seed exhibited in Competition by Growers to whom Medals were awarded.		Number of Competitors.	Award.	Competitors to whom Medals were adjudged.		Produce per Imperial Acre.	Weight per Bushel.	Date of Sowing.	Date of Reaping.	Ground on which the Prize Seed was Grown.		
	Names of Species and Varieties.	Quantity.			Christian Name and Surname.	Estate or Farm, and Post Town.					Altitude.	Exposure.	Nature of Soil.
		qrs.					qrs.	lbs.	1860.	1861.	Feet.		
Edinburgh, 22d October 1861.	Hopetoun Wheat, .	5	1	Silver Medal,	Thomas Elder, . .	Amisfield Mains, Haddington, ...	$4\frac{1}{2}$	$63\frac{3}{4}$	Nov. 24,	Aug. 23,	250	South.	Friable loam.
	Woolly-Eared Wheat,	5	3	Silver Medal,	Robert Cross, . .	Hilltown, Liberton, . . .	$4\frac{3}{4}$	$64\frac{1}{2}$	Nov. 30,	Sept. 5,	250	East.	Loamy.
	Woolly-Eared Wheat,	5	3	Bronze Medal,	Bentlem Douglas .	Cairntows, Liberton, . .	4	63	Jan. 1861,	Sept.,	70	North.	Light open bottom.
	Red Chaff White Wheat, . . .	5	2	Silver Medal,	Robert Hislop, Jr.,	Prestonpans, ...	$3\frac{1}{2}$	64	Nov. 12,	Aug. 20,	70	North.	Loam.
	Red Straw White Wheat, . . .	5	1	Silver Medal,	James Stenhouse,	Myles, Tranent.	$4\frac{1}{2}$	64	Nov. 6.	Aug. 19,	330	North.	Sandy clay on freestone.
	Trump White Wheat,	5	1	Silver Medal,	Robert Binnie, . .	Seton Mains, Tranent . .	$4\frac{1}{2}$	63	Nov.,	Aug.,	70	South.	Loamy.
	Archer's Prolific Wheat, . . .	5	5	Silver Medal,	Robert Cross, . .	Hilltown, Liberton, . . .	4	66	Nov. 30,	Sept. 9,	250	East.	Loamy.
	Archer's Prolific Wheat, . . .	5	5	Bronze Medal,	George Stenhouse,	West Pilton, Blackhall, . .	6	64	Sept. 16,	Aug. 20,	60	South.	Stiff clay.
	Sherriff's Bearded White Wheat, .	5	1	Silver Medal,	John Deans, . . .	Hedderwickhill, Dunbar, .	..	$64\frac{1}{2}$	Nov. 16,	Aug. 19,	10	South.	Strong loam.
	Hunter's Improved Wheat, . . .	5	1	Silver Medal,	John Dickson, . .	Saughton Mains, Murrayfield, ...	$5\frac{6}{8}$	$64\frac{1}{2}$	Nov. 18,	Aug. 26,	240	South.	Black loam.
	Druid White Wheat,	5	2	Silver Medal,	Alex. M'Dougal, .	Granton, Edinburgh, . .	7	$63\frac{1}{2}$	Nov. 11,	Aug. 28,	20	North.	Strong loam.
	Pringle's Bearded White Wheat, .	5	2	Silver Medal,	William Pringle, .	Harperdean, Haddington, .	..	64	Nov. 20,	Aug. 23,	..	South.	Light loam.
	Smooth Chaff White Wheat, .	5	1	Silver Medal,	James Park, . .	Clifton Hall Mains, Ratho,	$5\frac{1}{2}$	$63\frac{3}{4}$	Nov. 6,	Aug. 12,	200	Level.	Light sandy.
	Sherriff's Bearded Red Wheat, . .	5	3	Silver Medal,	James Hope, . .	Duddingston, Portobello, .	$5\frac{1}{2}$	64	Nov. 22,	Aug. 20,	60	North.	Light soil.
	Sherriff's Bearded Red Wheat, . .	5	3	Bronze Medal,	Thomas Mylne, .	Niddry Mains, Liberton, .	5	65	Nov. 15,	Aug. 24,	90	Flat.	Light loam.
	Dunstable Red Wheat,	5	1	Silver Medal,	John Proudfoot, .	Pinkie, Musselburgh, . .	6	66	Nov. 10,	Aug. 15,	30	South.	Gravelly.
	Giant Red Wheat, .	5	1	Bronze Medal,	Robert Binnie, . .	Seton Mains, Tranent . .	4	63	Nov.,	Aug.,	50	North.	Gravelly.

RETURNS OF DISTRICT SEED COMPETITIONS held in 1861 and 1862.

Districts.	Seed exhibited in Competition by Growers to whom Silver Medals were awarded. Name of Species and Varieties.	Quantity.	Number of Competitors.	Award.	Competitors to whom Silver Medals were adjudged. Christian Name and Surname.	Estate or Farm, and Post-Town.	Produce per Imperial Acre.	Weight per Bushel.	Date of Sowing.	Date of Reaping.	Altitude.	Exposure.	Nature of Soil.
		Qrs.		£ s.			Qrs.	lb. oz.			Feet.		
Fifeshire. Nov. 5, 1861.	Wheat—"Jackson's Nonsuch," . .	3	4	2 0	A. W. Russell, . .	Parkhill, Newburgh, Fife.	5	64 0	Oct. 29, 1860.	Aug. 19, 1861.	30	South.	Strong blue clay.
Ayr. Oct. 31, 1861.	Wheat—"English Chaddam," . .	3	3	2 0	Captain Campbell of Craigie,	Craigie, Ayr, ...	5	3 0	Dec. 1, 1860.	Aug. 23 & 24, 1861,	100	North.	Light sandy loam.
	Barley—"Chevalier," . .	3	2	2 0	Thomas Bone, . .	East Sanquhar, St Evox, Ayr, .	6 qrs. and 6 bush.	56 8	April 2, 1861,	Aug. 15, 1861,	38	South.	Light gravelly—parts grey-sandy.
	Oats—"Tam Findlay," . .	3	3	2 0	C. D. Gairdner, .	Auchans, Dundonald,	Not thrashed.	48 0	March 23, 1861,	Sept. 7, 1861,	..	S.W.	Clay.
	Rye-Grass—"Perennial," . .	2 bush.	5	2 0	Wm. Young, . .	Woodside, Kilwinning,	24 bush.	30 0	April 20, 1861,	July 15 to 20, 1861,	140	N.W.	Clay and gravel.
Inverness. Feb. 28, 1862.	Chevalier Barley, .	3	8	1 10	Hugh A. Gair, .	Hilton, Inverness, . . .	4½	56 8	April 15, .	End of Aug.	100	South.	Light black loam on gravelly subsoil.
	Sandy Oats, . .	3	8	1 10	John Smith, . .	Drumbuie, Dumnadrochit,	5	44 12	April 8, . .	Sept. 16, .	100	South.	Black loam on open subsoil.
	Perennial Ryegrass,	2	4	1 10	Wm. Cameron, .	Upper Muckovie, Inverness,	2½	24 0	May 3, . . .	August 10,	480	North.	Black loam on mountain clay.
Black Isle Society. March 6, 1862.	Chevalier Barley,	3	2	1 0	Alex. Thomson, .	Tarradale, Beauly, . . .	4½	58 0	April 25, .	Sept. 14, .	70	South.	Light sharp.
	Potato Oats, . . .	3	4	1 0	Donald M'Kay, .	North Kersoch, Inverness, ...	5½	46 4	March 29, .	August 20, .	90	South.	Light—gravel bottom.
Nairn. March 7, 1861.	Grey Angus Oats, .	3	3	1 15	James Sharp, . .	Newton of Budgate, Nairn,	6½	44 0	March 26, 1860,	Sept. 28, 1860,	300	North.	Clay and shingle.
	Chevalier Barley, .	3	5	1 15	John Robb, . .	Arr, Nairn, ...	6	55 8	April 10, 1860,	Oct. 1, 1860,	500	Level.	Black loam.
Nairn. Oct. 24, 1861.	White Wheat, . .	3	3	2 5	Alex. M'Arthur,	Boghole, Forres, . . .	3⅝	63 6	Nov. 15, 1860,	Aug. 30, 1861,	180	North.	Black loam, undrained.
Nairn. March 6, 1862.	Perennial Ryegrass,	2	2	1 10	William Clark, .	Easter Brightmony, Nairn,	2	27 8	April 6, 1860,	July 8, 1861,	250	North.	Rich mortar soil.
	Grey Angus Oats, .	3	6	1 10	Alex. F. Maclennan,	Meikle Urchany, Nairn,	5	45 3	March 14, 1861,	Sept. 16, 1861,	500	Do.	Black loam, drained
	Chevalier Barley, .	3	4	1 10	John Robb, . .	Arr, Nairn, ...	4½	57 10	April 1, 1861,	Sept. 15, 1861,	350	South.	Black loam, drained
Stirling. Oct. 11, 1862.	Hunter's Wheat, .	3	10	1 0	Neil MacEwen,	Blackdub, Stirling, . .	3½	64 4	Nov. 8, 1860.	Aug. 26, 1861,	10-15	South.	Kerse clay.

LIST OF PLOUGHING COMPETITIONS *reported to the Society in* 1861-1862.

District.	Date.	No. of Ploughs.	Extent.	Time.	Amount of Premium.	First Premium and Society's Medal awarded to
Aberdeenshire—						
Bodychell, Pitsligo	12 Dec. 1861	45	$\frac{1}{3}$ acre	$4\frac{1}{2}$ hours	£3 2 0	George Chalmers, Whitewell.
Buchan Agricultural Society, Monyruy	11 Dec. 1861	54	$\frac{1}{3}$ acre	4 hrs. 20 m.	4 11 6	James Angus, Strichen.
Ennenteer	16 Jan. 1862	30	$\frac{1}{3}$ acre	$4\frac{1}{2}$ hours	4 8 0	George Murray, Manse, Leochel Cushnie.
Logie Elphinstone	6 Dec. 1861	45	$1\frac{3}{4}$ roods	$4\frac{1}{2}$ hours	8 13 0	James Duncan, Warthill.
Newhills Association, Asktown ...	19 Dec. 1861	29	$\frac{1}{2}$ acre	5 hours	4 0 0	Lachlan Kemp, Smithyhill.
Tillymauld	10 Dec. 1861	27	$\frac{1}{3}$ acre	$3\frac{1}{4}$ hours	3 0 0	William Wilson, Auchnamoon.
Argyllshire—						
Bracklay, Dalmally	28 Feb. 1862	17	$\frac{1}{2}$ acre	5 hours	3 6 0	James Brown, Edendonich.
Grasspoint Farm	28 Feb. 1862	17	$\frac{1}{4}$ acre	$2\frac{1}{4}$ hours	3 1 6	Hugh Lyon, Gorston.
Invernahyle	28 Feb. 1862	15	1 rood 24 poles	6 hrs. 24 m.	5 12 6	Duncan Black, Barcaldine.
Laggan, Lochbuy	27 Feb. 1862	16	$\frac{1}{4}$ acre	4 hours	3 0 0	Lauchlan M'Laine, Lochbuy.
Laigh Knockrioch	21 Jan. 1862	39	2 roods	5 hrs. 7 m.	4 7 6	Archibald Duncan, Bellfield.
Lorn Agricultural Society, Connell,	28 Feb. 1862	25	1 rood	4 hours	3 0 0	Duncan Campbell, Dalmturst.
Lorn Agricultural Society, Ferlochan	14 Mar. 1862	15	1 rood 17 poles	5 hrs. 47 m.	3 0 0	Donald Sinclair, jun., Auchinreir.
Maam, Inverary	14 Mar. 1862	15	$\frac{1}{2}$ acre	6 hours	3 0 0	Hugh Cameron, Inveraray.
Margmonachan	14 Feb. 1862	19	2 roods	5 hours	3 3 6	John Armour, Glencardoch.
Poltalloch Farming Society, Drimvore	5 Feb. 1862	20	$\frac{1}{2}$ acre	5 hours	3 16 0	Duncan Stewart, Dunornuck.
Ayrshire—						
Ardrossan Society, Wood	8 Feb. 1862	18	Rate of 1 acre	12 hours	3 12 0	Ebenezer Speirs, Boydston.
Ballochmyle, Mauchline	18 Feb. 1862	30	Rate of 1 acre	14 hours	4 10 0	Thomas Wallace, Bogwood.
Barskimming, Mauchline	10 Jan. 1862	21	$\frac{1}{2}$ acre	5 hours	4 15 0	John Morrison, Muir.
Carrick Farmers' Society, Greenan	21 Feb. 1862	44	1 rood	4 hours	3 15 0	John M'Millan, Glenside.
Colmonell Association, Craigend ...	6 Mar. 1862	18	1 rood 33 poles	5 hours	3 0 0	James Drynan, Barchlewan.
Cumnock	9 Jan. 1862	28	1 rood	4 hours	3 7 6	William Smith, Thirdpart.
Dalmilling	29 Jan. 1862	21	1 rood 24 poles	5 hours	3 10 0	William Sloan, Blairmulloch.
Fenwick Society, Midland	18 Feb. 1862	27	Rate of 1 acre Sc.	16 hours	6 7 0	John Thomson, Craighall.
Grougar Mains, Kilmarnock ...	13 Feb. 1862	17	Rate of 1 acre	16 hours	5 4 0	William Cameron, Dykescroft.
High Glengaw, Ayr	9 Jan. 1862	16	Rate of 1 acre Sc.	16 hours	4 3 0	Alexander White, Carcluie.
Kilmarnock Farmers' Club, Holmes Farm	7 Feb. 1862	53	1 rood 20 poles	5 hours	5 13 6	Daniel Kirkland, Shields.
Kirkland, Kirkoswald	22 Feb. 1862	38	1 rood	3 hours	3 7 6	Thomas Ferguson, Drumdow.
Lainshaw Mains	23 Feb. 1862	25	1 rood 20 poles	4 hours	4 5 0	William Dunlop, Peacockbank.
Muirkirk	19 Feb. 1862	16	$\frac{1}{2}$ acre	$6\frac{1}{2}$ hours	3 3 0	Robert Maxwell, Greenock Mains.

LIST OF PLOUGHING COMPETITIONS (*Continued*).

District.	Date.	No. of Ploughs.	Extent.	Time.	Amount of Premium.	First Premium and Society's Medal awarded to
Ayrshire (*Continued*)—						
St Quivox Society, Clune	29 Jan. 1862	23	1 rood 20 poles	6 hours	£4 10 0	William Anderson, Kirkhill.
Walstown, Ochiltree	12 Feb. 1862	24	Rate of 1 acre Sc.	16 hours	4 6 0	Duncan White, Cooperhill.
Wellhill	5 Feb. 1862	28	Rate of 1 acre Sc.	16 hours	4 9 0	David Smith, Bank.
West Cairngillan, Tarbolton ...	25 Jan. 1862	37	Rate of 1 acre	14 hours	4 0 0	John Allan, Millburn.
West Kilbride	26 Feb. 1862	41	Rate of 1 acre	11 hrs. 45 m.	3 14 6	George Halbert, Chapelton.
Banffshire—						
Ballindalloch	19 Dec. 1861	27	½ acre	6 hours	5 0 0	Alexander Mackay, Ballindalloch.
Clashnoir	29 Jan. 1862	20	½ acre	5 hours	3 9 0	Daniel Macinnes, Achdregnie.
Mill of Auchintoul	19 Dec. 1861	33	1 rood 20 poles	4 hours	3 14 3	Robert Redford, Knockorth.
Berwickshire—						
Broomybank, Westruther	14 Dec. 1861	35	½ acre	5 hours	4 14 6	Alexander Galbraith, Thornidyke Mains.
Eccles Ploughing Assoc., Grizzelrig	18 Dec. 1861	21	⅝ acre	7 hours	5 0 0	John Wilson, Wormerlaw.
Fogo Ploughing Club, Bogend ...	23 Dec. 1861	21	¾ acre	7 hours	3 15 0	John Walker, Fogorig.
Hirsel, Coldstream	20 Dec. 1861	24	¾ acre	7 hours	7 12 6	William Alexander, Lennie Hill.
Lammermuir Ploughing Club, Millknowe	6 Feb. 1862	20	Rate of 1 acre.	9 hours	3 0 0	George Gillie, Cranshaws.
Lauderdale Society, Addinstone ...	7 Dec. 1861	16	¾ acre	7 hours	4 9 6	Peter Brotherstone, West Mains.
Linnhead	19 Dec. 1861	25	⅝ acre	6 hours	4 8 0	William Sligh, Cove.
Maines, Chirnside	29 Jan. 1862	23	¾ acre	7 hours	3 0 0	Robert Aikman, Edington Mains.
Melrose Farmers' Club, Dryburgh Mains	21 Dec. 1861	54	½ acre	6 hours	5 17 6	James Anderson, Boghall.
Middlethird, Gordon	15 Feb. 1862	30	¾ acre	7 hours	7 0 0	Ebenezer Hutton, Greenknowe.
Rulesmains, Dunse	9 Jan. 1862	25	⅝ acre	8 hours	7 17 6	Thomas White, Dunse Law.
Buteshire—						
Acholter	7 Feb. 1862	45	Rate of 1 acre Sc.	16 hours.	7 19 0	Robert Stewart, Upper Ardroscadale.
Arran Farmers' Society, Clauchan	12 Feb. 1862	35	Rate of 1 acre Sc.	18 hours	6 9 0	Neil Ferguson, Arran.
Caithness-shire—						
Caithness Agricultural Soc., Westerseat	4 Feb. 1862	65	½ acre	4½ hours	3 15 0	John Moodie, Stemster.
Mains of Lybster	12 Feb. 1862	21	½ acre	5 hours	4 17 6	Benjamin Miller, Latheronwheel.
Dumbartonshire—						
Dumbarton Association, Crosslet, ...	7 Feb. 1862	19	Rate of 1 acre Sc.	11 hours	4 17 6	John Buchanan, Strathleven.
Kilmaronock and Bonhill Society, Middle Auchincarroch ...	28 Jan. 1862	21	Rate of 1 acre	16 hours	5 3 6	Peter More, Cameron House.

LIST OF PLOUGHING COMPETITIONS (*Continued*).

District.	Date.	No. of Ploughs.	Extent.	Time.	Amount of Premium.	First Premium and Society's Medal awarded to
DUMFRIESSHIRE—						
Barr	15 Feb. 1862	23	$\frac{1}{2}$ acre	6 hours	£4 17 6	William Hyslop, Nethercairn.
Greystones	7 Feb. 1862	30	$\frac{1}{2}$ acre	5 hours	4 10 0	John Lindsay, Stappleton.
Logan Mains	17 Jan. 1862	23	1 acre	10 hours	6 0 0	George Farrish, Branteth.
Mid Knock	8 Feb. 1862	16	$\frac{3}{8}$ acre	$4\frac{1}{2}$ hours	3 7 0	James Knox, Carlisgill.
Palace Knowe	17 Jan. 1862	26	$\frac{1}{2}$ acre	6 hours	7 12 6	James Burgess, Lochwood Mains.
Park House	4 Feb. 1862	29	$\frac{1}{2}$ acre	5 hours	6 8 6	Robert Taggart, Woodhouselees.
Penpont	17 Jan. 1862	22	$\frac{1}{2}$ acre	$5\frac{1}{4}$ hours	4 7 6	William M'Call, Clonhie.
EDINBURGHSHIRE—						
Cockpen	30 Nov. 1861	27	$\frac{1}{2}$ acre	5 hours	3 4 6	George Rutherford, Lingerwood.
Edgelaw	20 Dec. 1861	33	$\frac{1}{2}$ acre	$6\frac{1}{2}$ hours	5 2 6	Thomas Inglis, Aitkendean.
Halkerston, Borthwick	13 Dec. 1861	32	Rate of 1 acre	10 hours	4 10 0	Charles Lonie, Stobsmills.
Lymphoy, Currie	10 Dec. 1861	50	$\frac{1}{2}$ acre	$7\frac{1}{2}$ hours	6 4 6	James Robertson, Harlaw.
Toxside, Temple	17 Dec. 1861	32	$\frac{1}{2}$ acre	$5\frac{1}{2}$ hours	3 11 6	William Cowan, Arniston.
Woolmet	15 Mar. 1862	22	$\frac{1}{2}$ acre	8 hours	3 11 6	A. Ritchie, Longthorn.
ELGINSHIRE—						
Milltown of Dalvey	14 Mar. 1862	24	Rate of 1 acre	9 hours	3 1 6	Donald M'Lean, Auchernack.
FIFESHIRE—						
Balkaithly, Denino	30 Jan. 1862	26	$\frac{3}{4}$ acre	6 hours	3 7 6	David Sutherland, Kippo.
Bankhead	14 Jan. 1862	37	$\frac{3}{4}$ acre	7 hours	4 4 0	Robert Galloway, Cardenbarns.
Conland	6 Feb. 1862	23	$\frac{1}{2}$ acre, 3 poles		3 2 6	Peter Donaldson, Paris.
Crossgates Ploughing So., South Fod	13 Dec. 1861	33	$\frac{1}{2}$ acre	5 hours	3 7 6	Walter Birrell, Bromside.
Donibristle	13 Jan. 1862	37	$\frac{1}{2}$ acre	5 hours	3 8 6	Alexander Farmer, Kirkton.
Largo Ploughing So., Wester Lathallan	15 Jan. 1862	28	$\frac{1}{2}$ acre	5 hours	3 5 6	Robert Bruce, Balcormo.
Leslie District Society, Balfarg ...	10 Jan. 1862	29	$\frac{1}{2}$ acre	5 hours	3 16 0	Alexander Heatherwick, Ryelaw.
Wester Colquhally	12 Dec. 1861	19	$\frac{1}{2}$ acre	5 hours	3 0 0	Robert Main, Hairstanes.
FORFARSHIRE—						
Cortachy Home Farm	1 Feb. 1862	44	$\frac{1}{2}$ acre	6 hours	4 15 0	James Cossens, Dykehead.
Lundie Castle	12 Dec. 1861	40	$\frac{1}{2}$ acre Scotch	5 hours	7 10 0	Alexander Stewart, Camperdown.
Maulesden, Brechin	13 Jan. 1862	33	3 roods	7 hours	3 0 0	James Smith, Broomfield.
Newton, Inverarity	10 Dec. 1861	81	$\frac{1}{2}$ acre	5 hours	7 1 6	David Smith, Washingdales.
Oathlaw and Tannadyce Ploughing Club, Haughs of Finhaven	5 Dec. 1861	43	$\frac{1}{2}$ acre	6 hours	3 16 8	John Sutherland, Haughs of Finhaven.
Spott	6 Feb. 1862	19	$\frac{1}{2}$ acre	5 hours	3 10 0	Robert Waterston, Dalship.

LIST OF PLOUGHING COMPETITIONS (*Continued*).

District.	Date.	No. of Ploughs.	Extent.	Time.	Amount of Premium.	First Premium and Society's Medal awarded to
HADDINGTONSHIRE—						
Dunbar, Spott, and Innerwick Ploughing Club, Easter Burnhouse	18 Jan. 1862	38	$\frac{1}{3}$ acre	5 hours	4 15 0	George Runciman, Newtonlees.
INVERNESS-SHIRE—						
Cullachie, Abernethy	27 Feb. 1862	16	2 rds. 4 pls. 16 yds.	5 hours	4 2 6	James M'Intosh, Croftronan.
Easter Lovat	17 Feb. 1862	53	$\frac{1}{2}$ acre	5 hours	6 2 6	Duncan Henderson, Tomich.
Inverness Farmers' Society, Balloan of Culduthil	11 Mar. 1862	24	$\frac{1}{2}$ acre	5 hours	5 15 0	Francis Fraser, Leys.
Strathdearn Association, Garbal ...	13 Mar. 1862	15	$\frac{1}{2}$ acre	5 hours	5 5 6	John M'Gillivray, Morile.
Strathnairn Association, Largintour	13 Mar. 1862	17	$\frac{1}{2}$ acre	5 hours	4 2 6	John Robb, Daltullich.
KINCARDINESHIRE—						
Boginreath, Durris	18 Dec. 1861	44	$\frac{1}{3}$ acre	$3\frac{1}{4}$ hours	6 9 0	John Rogie, Currickstone.
Cookstone, Portlethen	7 Jan. 1862	32	$\frac{1}{2}$ acre	5 hours	7 11 0	Joseph Balnaves, Bourtrie Bush.
Drumnagair	5 Dec. 1861	36	$\frac{1}{2}$ acre	5 hours	4 13 6	William Watt, Muirton.
Elsick Ploughing Association, Newhall	8 Jan. 1862	21	$\frac{1}{2}$ acre	6 hours	6 0 0	James Taylor, Jellybrands.
Fettercairn Farmers' Club, Bent of Halkerton	7 Dec. 1861	71	$\frac{1}{2}$ acre	5 hours	4 0 0	William Lawrence, Balmanno.
How o' the Mearns Club, Redmyre	17 Dec. 1861	82	$\frac{1}{3}$ acre		5 0 0	David Irons, Cairnton.
Netherley Association, Barrowfield	17 Dec. 1861	22	$\frac{1}{3}$ acre	$3\frac{1}{2}$ hours	5 2 0	George Moir, Backburn.
Rickarton Home Farm	3 Jan. 1862	23	Rate of 1 acre	10 hours	4 15 6	John Caird, Newbigging of Rickarton.
KINROSS-SHIRE—						
Fossoway District Ploughing Association, Wester Coldrain ...	14 Feb. 1862	28	$\frac{1}{2}$ acre	7 hours	3 4 0	John Kirk, East Hilton.
KIRKCUDBRIGHTSHIRE—						
Kirouchtree	30 Jan. 1862	43	$\frac{1}{2}$ acre	6 hours	5 0 0	James Parker, Pillwhilly.
Londes	24 Jan. 1862	23	$\frac{1}{2}$ acre	$4\frac{3}{4}$ hours	4 10 0	Hugh Dobie, Carsegowan.
Newfield, Dalry	24 Jan. 1862	26	$1\frac{1}{4}$ rood	$3\frac{1}{2}$ hours	4 7 6	David Tait, Gateside.
Torrorie	16 Jan. 1862	28	$\frac{4}{5}$ acre	4 hours	4 7 6	Archibald M'Kirdle, Southwick.
LANARKSHIRE—						
Cadder District Society, Auchinleck	28 Jan. 1862	26	$\frac{1}{2}$ acre	$6\frac{1}{3}$ hours	9 5 0	Andrew Mitchell, Balmuldy.
Eastfield, Culter	18 Feb. 1862	19	$\frac{3}{4}$ acre	8 hours	3 16 6	Henry Wyper, Unthank.
Glenboig, Newmonkland	14 Jan. 1862	19	1 rood, 20 poles	5 hrs. 50 m.	6 12 6	William Jackson, Inchney.

LIST OF PLOUGHING COMPETITIONS (*Continued*).

District.	Date.	No. of Ploughs.	Extent.	Time.	Amount of Premium.	First Premium and Society's Medal Awarded to
LANARKSHIRE (*Continued*)—						
Netherton, East Kilbride	28 Jan. 1862	32	¾ acre	8 hours	8 12 6	William Duncan, Turnlaw.
Newton, Wiston	28 Jan. 1862	18	3 roods	7½ hours	5 0 0	Thomas Saidler, Greenhill.
Weymiss Hill, Cambusnethan	17 Jan. 1862	24	½ acre	7 hours	5 18 0	Alexander Hamilton, Dalserf.
LINLITHGOWSHIRE—						
Bridgend	9 Jan. 1862	24	½ acre	7½ hours	3 17 6	John Hunter, Carriden.
ORKNEY—						
Elwickbank	6 Feb. 1862	23	2 roods, 1 pole	4 hours	3 18 0	Malcolm Heddle, Balfour Mains.
PEEBLESSHIRE—						
Noblehall, Newlands	20 Dec. 1861	22	1 acre	10 hours	3 2 0	Robert Thomson, Noblehouse.
Standalane	15 Jan. 1862	26	½ acre	8 hours	4 17 0	John Fraser, Kidstone.
Standalane	30 Jan. 1862	20	Rate of 1 acre	10 hours	3 0 0	John Wilson, Chapelhill.
Woodhouse, Manor	16 Jan. 1862	16	½ acre Scotch	7 hours	3 11 6	John Mackay, Bellanridge.
PERTHSHIRE—						
Arnprior District Ploughing Society, Arnprior	19 Jan. 1862	30	Rate of 1 acre	14 hours	4 7 0	David M'Lay, Muirton.
Breadalbane (Eastern) Association, Boreland	12 Mar. 1862	24	½ acre	7 hours	3 0 0	Peter Robertson, Glenlyon House.
Breadalbane (Western) Association, Sheet House, Killin ...	14 Mar. 1862	22	½ acre	6 hours	3 0 0	Peter Christie, Croftchose.
Broughderg	14 Mar. 1862	15	75 to 90 poles	7 hours	3 10 0	Donald Morrison, Spittal.
Buradwell	15 Jan. 1862	24	½ acre	5 hours	3 16 6	William Wannan, Ballo Mill.
Culthill	20 Feb. 1862	36	½ acre	5 hours	4 14 0	Alexander Mitchell, Essendy.
Dun-Alastair	5 Nov. 1861	15	1 rood	5 hours	5 0 0	Donald Cameron, Mains of Foss.
Dupplin Home Farm	9 Jan. 1862	50	½ acre	5 hours	4 0 0	George Graham, Cultmalundie.
Gallowhill	18 Feb. 1862	22	1 rood 20 poles	5 hours	3 0 0	John Mailer, Eind.
Glenalmond	17 Feb. 1862	18	1 rood 20 poles	4 hours	3 9 0	Donald Miller, Fendoch.
Glengarry and Glenerrochy Farmers' Club, Kindrochet	29 Mar. 1862	17	Rate of 1 acre	10 hours	5 4 6	Duncan M'Gregor, Blair Athole Manse.
Lawers	18 Feb. 1862	21	½ acre Scotch	8 hours	3 17 0	David Harley, Strowan.
Logiealmond and Lynedoch Society, Frauchton	20 Feb. 1862	22	1 rood 16 poles	3 hrs. 44 m.	3 5 0	William Taylor, Mullion.
Methven Society, Drumharvie ...	15 Feb. 1862	33	2 roods 14 poles	6 hours	3 9 0	David Keddie, Cultmalundie.
Muthill	26 Feb. 1862	16			5 10 6	Thomas Marshall, Templemill.

LIST OF PLOUGHING COMPETITIONS (*Continued*).

District.	Date.	No. of Ploughs.	Extent.	Time.	Amount of Premium.	First Premium and Society's Medal Awarded to
PERTHSHIRE (*Continued*)—						
Spittalton	5 Feb. 1862	22	$\frac{1}{2}$ acre Scotch	7 hours	3 0 0	William Mackison, Ballingrew.
St Martin's Association, Damside ...	25 Feb. 1862	27	$\frac{3}{4}$ acre	$7\frac{1}{2}$ hours	4 0 0	William Paterson, Damside.
RENFREWSHIRE—						
Bogside, Eaglesham	13 Feb. 1862	21	$\frac{1}{2}$ acre	$7\frac{1}{2}$ hours	4 16 0	John Morrison, Crosslees.
Greenlaw, Mearns	28 Jan. 1862	19	Rate of 1 acre Sc.	18 hours	3 4 0	James Ballantine, Holm.
ROSS and CROMARTY—						
Aiguish Farm, Island of Lews, ...	26 Feb. 1862	19	$\frac{3}{4}$ acre	7 hours	3 0 0	Donald M'Donald, Tong Farm.
Brae	7 Jan. 1862	47	$\frac{1}{2}$ acre	5 hours	3 0 0	John Macdonald, Belmaduthy.
Corntown, Ferrintosh	6 Dec. 1861	33	$\frac{1}{2}$ acre	5 hours	3 10 0	Roderick M'Rae, Torgorm.
Cromarty Ploughing Association, Braelangwell	27 Feb. 1862	45	$\frac{1}{2}$ acre	5 hours	5 17 6	William Munro, Rosefarm.
ROXBURGHSHIRE—						
Union Society, Smailholm Mains ...	12 Feb. 1862	60	$\frac{3}{4}$ acre	6 hours	12 5 0	John Mather, Holefield.
West Teviotdale Society, Spittal ...	13 Jan. 1862	27	$\frac{1}{2}$ acre	6 hours	8 0 0	Andrew Pender, Harwood.
STIRLINGSHIRE—						
Blairdrummond and Ochtertyre Club,	28 Jan. 1862	27	Rate of 1 acre Sc.	16 hours	4 16 0	Andrew Ferguson, Westwood.
Craigieburn, Falkirk	27 Jan. 1862	17	$\frac{1}{2}$ acre	$8\frac{1}{2}$ hours	4 7 6	Thomas Denholm, Lochgreen.
Glenbervie Ploughing Club, Fiddes Farm	4 Dec. 1861	42	1 rood 24 poles	4 hours	7 7 6	Hugh Smith, W. Kinmonth.
Logie and Lecropt Society, Cornton	30 Jan. 1862	32	Rate of 1 acre Sc.	16 hours	14 5 0	William Johnman, Frew.
Port of Monteith Ploughing Club, Ballabeg	18 Feb. 1862	18	Rate of 1 acre Sc.	15 hours	3 0 0	Robert Sorley, Lennieston.
Westhaugh, Logie	30 Jan. 1862	25	Rate of 1 acre Sc.	15 hours	4 7 6	John Mackison, Greenocks.
West Plean	15 Jan. 1862	26	$\frac{1}{2}$ to $\frac{3}{4}$ acre	5 to $7\frac{1}{2}$ hrs.	6 12 6	William Hay, Bankhead.
SUTHERLANDSHIRE—						
Kirkton	14 Mar. 1862	40		$5\frac{1}{2}$ hours	6 2 6	William M'Dougal, Embo.
WIGTOWNSHIRE—						
Drumtrodden	17 Jan. 1862	53	$\frac{1}{2}$ acre	5 hours	7 17 6	Neill Gelston, Monreith.
Freugh, Stoneykirk	21 Dec. 1862	43	$\frac{1}{2}$ acre	5 hours	5 12 6	David Fleming, Mye.
Genoch Mains	11 Mar. 1862	29	1 rood 30 poles	4 hours	4 15 6	Daniel Laverie, Dunragit.
High Curghie, Kirkmaiden	4 Jan. 1562	43	$\frac{1}{2}$ acre	5 hours	5 3 0	Robert Caffel, Cairngaan.
Kirkland	7 Jan. 1562	34	$\frac{1}{2}$ acre	$4\frac{1}{4}$ hours	7 15 0	William Donnan, Airies.

PROCEEDINGS IN THE LABORATORY.

By Thomas Anderson, M.D., Professor of Chemistry in the University of Glasgow, and Chemist to the Society.

ON THE COMPOSITION OF THE WHEAT CROP AT DIFFERENT PERIODS OF ITS GROWTH.

In the Transactions of the Society for March 1860, I published the results of a minute investigation of the turnip crop, undertaken with the view of determining the amount of mineral and vegetable matters extracted by it from the soil at different periods of its growth, and which was intended to form the commencement of a series of similar investigations, extending over all the more important cultivated crops. The interest and importance attaching to such a series of investigations, in a purely scientific point of view, are sufficiently obvious, and their bearing upon various matters connected with the practical management of the farm, though perhaps less immediately apparent, is equally unequivocal. To trace the progress of a crop, and define the period within which its active growth is comprised, may frequently enable us to throw much light on various questions relating to the most advantageous modes of cultivating and manuring it, may serve to explain some of those causes which render particular soils peculiarly favourable to the growth of certain plants, and may possibly assist in elucidating to some extent the influence of season and climate.

In the paper just quoted, some of these points have been shortly referred to, and it will be unnecessary to discuss them at the present moment, further than to remark that the length of time a crop requires to reach full maturity has always been recognised as exercising an important influence over its production. The turnip, which formed the subject of the investigation already alluded to, has generally been considered as the type of a quick-growing plant; while wheat has been supposed to stand in an opposite position, and to be distinguished from all other ordinary farm crops by the long period over which its vegetation extends. This idea has been made the foundation of various speculative views regarding the mode of its growth, and it has been supposed that it takes up its food more slowly than the turnip, and requires a smaller supply at any one moment. It will be apparent from what follows that this view requires some modification.

The experiments now about to be detailed were made on the wheat crop immediately succeeding the turnips already analysed, and on the same field, at Oxgang, Kirkintilloch. As the position of the field, the nature and composition of its soil, and its general management, have been fully described in the previous paper, it

will be unnecessary to revert to them again, further than to state that no manure was applied to the wheat. The variety used was Hunter's yellow, which was sown in autumn, and in spring some grass seeds were given, as it was found that it would be more advantageous to lay the land down in grass than to follow out a complete rotation.

The season proved far from favourable to the crop. The winter of 1859-60 was extremely severe, and the spring late, in consequence of which its progress was by no means satisfactory; and on some parts of the field it appeared thin and unhealthy, insomuch that at one time I hesitated to pursue the experiments; but I was induced to continue from having already examined the turnips on the same soil; and fortunately the crop improved considerably during the course of the summer, although it could not at any time be considered fine, and the quality, when ripe, proved inferior.

At the very outset of the experiments, it became necessary to devise a plan for obtaining a uniform specimen of the crop at each successive period at which it was taken for analysis, a problem of much greater difficulty than might be at first sight supposed. In the case of the turnip it was easily accomplished by counting the plants growing on the acre, and taking a certain number of average bulbs for analysis, and in this way very satisfactory results were obtained. But a similar course was not practicable in the case of wheat, both because of the much greater number of plants on the acre, and the impossibility of counting them as they grew. I was, therefore, compelled to adopt some other plan, and after mature consideration I came to the conclusion that it would be best to gather all the plants from a definite fraction of an acre. The object, it will be observed, was not to obtain a general average of the whole field, but to secure a certain number of plots as exactly similar to one another as possible, and this offered some difficulty. From the irregularity of the crop, it was not possible to have large plots; nor did this seem necessary to accuracy. It was apparent at once, that with small spaces great precision might be obtained, provided the experiments throughout were conducted with care. The field was therefore carefully examined when the crop had advanced so far as to render it advisable to commence the analysis, and the most uniform portion was selected. In determining this point, I did not rest on my own opinion alone, but took advantage of the practical experience of my friend Mr Brown, on whose field the crop was grown. A part was pitched upon on which the crop was very uniform, but it was not of large extent. In the centre of this, plots of 5 square yards each were carefully measured off, and pins firmly fixed in the corners. Between these pins thin copper wires were extended about 2 inches above the surface of the ground, so as to define the

spaces distinctly. At each period all the plants within the wires were carefully taken up by loosening the soil with the spade, and lifting them one by one. The entire produce was conveyed to the laboratory, where it was weighed, and the analysis commenced at once, by determining the amount of water, and drying the entire mass of the plants for future experiment.

First Stage, 14*th May* 1860.

Owing to the extreme lateness of the season, it was not till the 14th May that it was deemed advisable to commence the analyses. At this period the crop was still very backward, each plant only weighing, on the average, 15.138 grains, and its height being about 4 or 5 inches. Immediately on being taken to the laboratory, the soil was detached from the roots by carefully shaking them in water, a process which, as subsequent experience showed, was not satisfactory; for even when they appeared quite clean, and no perceptible traces of soil were removed by repeated agitation with water, a very appreciable amount of sand adhered to them, and could be detected on analysing the ash. The results of analysis were as follows:—

Weight of total produce of 5 square yards,	10,402.37 grains.
Giving for the acre,	12 cwt. 3 qrs. 10 lb. 8 oz.

The leaves and roots of 100 average plants were separated, and weighed—

Weight of leaves,	1310.80 grs.
Weight of roots,	203.00 „
Weight of 100 plants,	1513.80 „
Average weight of each plant,	15.138 „

From which is calculated—

Total weight of leaves per acre,	1245.584 lb.
Total weight of roots per acre,	192.908 „
Total weight of produce,	1438.492 „

The leaves and roots were separately examined for the percentage of water, ash, and organic matter, which stood as follows:—

	Leaves.	Roots.
Water,	86.18	81.525
Organic matter,	11.79	15.991
Ash,	2.03	2.384
	100.00	100.000

Owing to the small quantity of material available at this early stage, it was found impossible to make complete analyses of the ash of leaves and roots separately, and they were therefore analysed together, giving the results which follow:—

Peroxide of iron,	3.16
Lime,	6.52
Magnesia,	2.15
Potash,	28.43
Chloride of potassium,	6.18
Chloride of sodium,	6.64
Phosphoric acid,	7.19
Sulphuric acid,	5.91
Silicic acid,	3.87
Carbonic acid,	5.26
Charcoal,	1.95
Sand,	23.34
	100.60

The same, after deduction of sand, charcoal, and carbonic acid, gives—

Peroxide of iron,	4.51
Lime,	9.31
Magnesia,	3.07
Potash,	40.58
Chloride of potassium,	8.81
Cloride of Sodium,	9.48
Phosphoric acid,	10.29
Sulphuric acid,	8.43
Silicic acid,	5.52
	100.00

Calculating from these data, we find that at this period the wheat plants had withdrawn from an acre of land the following quantities of different substances :—

Water,	1231.86 lb.
Organic matter,	177.88 „
Ash,	21.22 „
Total matter per acre,	1430.96 „

In comparing these with the results in a previous page, a certain discrepancy will be observed, for the total matter withdrawn from an acre of land is there stated at 1438.92 lb. The reason for this is that, in the first instance, the total amount of ash found is given, but this included a quantity of sand adhering mechanically to the roots, which is here deducted, its quantity having been ascertained in the detailed analysis of the ash.

The quantities of the different mineral matters removed from the soil at this stage are given in the following table :—

Peroxide of iron,	0.96 lb.
Lime,	1.98 „
Magnesia,	0.65 „
Potash,	8.58 „
Chloride of potassium,	1.88 „
Chloride of sodium,	2.02 „
Phosphoric acid,	2.19 „
Sulphuric acid,	1.79 „
Silicic acid,	1.17 „
	21.22 „

It is here to be observed that the progress of the wheat plant during the early period of its growth is extremely slow, so much so, that during more than six months' growth each plant has only attained a weight of 15 grains. And the amount of vegetable and mineral matters withdrawn from an acre is very small. Of the latter, one-half nearly consists of potash, and the remainder is pretty equally divided among the other mineral constituents.

Second Stage, 18th June.

During the month of May and beginning of June the plants began to make more rapid progress, the weather having become genial, and the period of active growth begun, the plants having by the 18th June increased to nearly eight times their former weight. Matters now stood as follows:—

Leaves of 100 average plants weighed, .	4683 grs.
Straws, ...	6576 „
Roots, ...	1368 „
Total weight of 100 plants, . .	12627 „
Average of each plant, ...	126.27 „
Total produce of 5 square yards, . . .	47740 „
Equal per acre, . . .	2 tons, 18 cwt. 3 qrs. 22 lb.

This weight was divided between leaves, roots, and straw, in the following proportions:—

Leaves, ...	2449 lb.
Straw, ...	3438 „
Roots, ...	715 „
	6602 „

Analysis of Leaves.

Water, ...	73.92
Albuminous compounds, ...	4.18
Other organic matters, ...	18.24
Ash, ...	3.66
	100.00
Nitrogen, ...	0.67

The ash contained—

Peroxide of iron, ...	1.84
Lime, ...	5.48
Magnesia, ...	1.65
Potash, ...	22.70
Chloride of potassium, ...	5.93
Chloride of sodium, ...	3.03
Phosphoric acid, ...	3.13
Sulphuric acid, ...	3.48
Silicic acid, ...	42.73
Charcoal, ...	2.45
Sand, ...	8.01
	100.43

The same, after deduction of sand and charcoal:—

Peroxide of acid,	2.04
Lime,	6.09
Magnesia,	1.84
Potash,	25.30
Chloride of potassium,	6.59
Chloride of sodium,	3.30
Phosphoric acid,	3.48
Sulphuric acid,	3.88
Silicic acid,	47.48
	100.00

Analysis of the Straw.

Water,	79.05
Albuminous compounds,	2.31
Other organic matters,	16.98
Ash,	1.66
	100.00
Nitrogen,	0.37

The composition of the ash was:—

Peroxide of iron,	1.47
Lime,	2.72
Magnesia,	1.55
Potash,	31.85
Chloride of potassium,	14.61
Chloride of sodium,	0.43
Phosphoric acid,	6.01
Sulphuric acid,	3.09
Silicic acid,	31.86
Carbonic acid,	4.83
Charcoal,	2.74
	101.16

And after deduction of charcoal and carbonic acid:—

Peroxide of iron,	1.57
Lime,	2.90
Magnesia,	1.65
Polash,	34.04
Chloride of potassium,	15.61
Chloride of sodium,	0.44
Phosphoric acid,	6.38
Sulphuric acid,	3.32
Silicic acid,	34.09
	100.00

In this and the subsequent stages it was found necessary to abandon the attempt to follow out the analysis of the roots, for, notwithstanding all care, it was impossible to separate the soil in a satisfactory manner. It adhered firmly to the minute fibres, and could not be detached without injuring them; and as this would have invalidated the results of the acreable produce calculated from them, it was thought better to omit all reference to them. Consequently, in calculating the acreable produce, the roots have been deducted, and only those matters contained in the straw and leaves estimated. In this case matters stood as follows:—

Total produce per acre,	6602 lb.
Deduct roots,	715 „
Leaves	5887 „

Which was composed as follows, the results being given in pounds:—

	Leaves.	Straws.	Total.
Water,	1810.30	2717.75	4528.05
Albuminous compounds,	102.36	79.42	181.78
Other organic matters,	446.69	583.77	1030.46
Ash,	89.63	57.07	146.71
	2448.98	3438.01	5887.00
Nitrogen,	16.39	12.72	29.11

Mineral Matters, in pounds.

	Leaves.	Straws.	Total.
Peroxide of iron,	1.81	0.89	2.70
Lime,	5.42	1.65	7.07
Magnesia,	1.63	0.94	2.57
Potash,	22.81	19.47	42.28
Chloride of potassium,	5.86	8.89	14.75
Chloride of sodium,	2.93	0.25	3.18
Phosphoric acid,	3.09	3.63	6.72
Sulphuric acid,	3.45	1.89	5.34
Silicic acid,	42.63	19.46	62.09
	89.63	57.07	146.70

In comparing these results with those of the previous stage, several points seem worthy of notice, some of which are not easily explained. It is to be observed that, although the weight of the average plant has increased nearly eight times, there is not a proportionate advance in the amount of produce, which is only about five times as great. This may be due to there having been a smaller number of plants in this plot in the first instance, although the eye certainly did not detect the difference; or it may have been caused by the disappearance of a part during the progress of growth. The plants in this case had also become somewhat less succulent, the percentage of water having fallen from 81.6 in the entire plants of the first stage to 79 in the straw, and 73.9 in the leaves in the second stage. Hence it follows that the amount of solid matters assimilated during this period was rather more than six times as great as in the previous growth. As regards the mineral matters, it is interesting to notice that the quantity of potash assimilated has been almost exactly in proportion to the increase of solid matter, while lime and phosphoric acid have only advanced to about three times their previous quantity. The larger size of the plants having also permitted the separate analysis of leaves and straw, it is now possible to trace the distribution of the mineral matters in these organs; and we observe that potash is very equally distributed between the two, but lime and silicic acid are chiefly accumulated in the leaves.

Third Stage, 23d July.

At this period the plants had again made a very decided increase,

and their size was sufficiently great to admit of a more minute subdivision of their parts. The ear had now begun to show, and it was separately analysed, while the straws were divided through the middle, and the upper and lower portions kept separate. Owing to the much greater weight of the plants, the average was calculated for fifty in place of a hundred, as had been done in the previous stages.

Ears of 50 average plants weighed . . .	1,410 grains.
Straws, upper part, ...	2,880 „
„ lower part, ...	7,090 „
Leaves, ...	2,040 „
Roots, ...	890 „
	14,310 „
Average weight of each plant, ...	286.2 „

Weight of total produce of 5 square yards, 143,937 grains. Total produce per acre, 8 tons 17 cwt. 1 qr. 12 lb. Divided thus—

Ears, ...	1,961 lb.
Straws, upper part, ...	4,006 „
„ lower part, ...	9,862 „
Leaves, ...	2,837 „
Roots, ...	1,288 „
Total, ...	19,904 „

The ears contained—

Water, ...	64.62
Albuminous compounds, ...	3.18
Other organic matters, ...	30.31
Ash, ...	1.89
	100.00
Nitrogen, ...	0.51

And the composition of their ash was—

Peroxide of iron, ...	0.45
Lime, ...	2.57
Magnesia, ...	4.35
Potash, ...	16.84
Chloride of sodium, ...	1.93
Phosphoric acid, ...	10.26
Sulphuric acid, ...	2.65
Silicic acid, ...	52.88
Charcoal, ...	5.99
Sand, ...	1.88
	100.00

The same, calculated after deduction of sand and charcoal:—

Peroxide of iron, ...	0.49
Lime, ...	2.79
Magnesia, ...	4.73
Potash, ...	18.31
Chloride of sodium, ...	2.09
Phosphoric acid, ...	11.17
Sulphuric acid, ...	2.88
Silicic acid, ...	57.54
	100.00

Analysis of the Straw.

	Upper portion.	Lower portion.
Water,	68.68	63.90
Albuminous compounds,	2.56	1.31
Other organic matters,	26.69	33.13
Ash,	2.07	1.66
	100.00	100.00
Nitrogen,	0.41	0.21

The ash contained—

	Upper portion.	Lower portion.
Peroxide of iron,	0.33	1.07
Lime,	2.00	3.08
Magnesia,	3.28	1.65
Potash,	20.70	11.59
Soda,	...	4.98
Chloride of potassium,	2.83	...
Chloride of sodium,	1.05	0.52
Phosphoric acid,	9.53	4.44
Sulphuric acid,	1.56	3.74
Silicic acid,	52.38	50.67
Charcoal,	6.63	18.13
	100.31	99.87

When recalculated after deduction of charcoal these analyses give—

	Upper portion.	Lower portion.
Peroxide of iron,	0.35	1.32
Lime,	2.13	3.76
Magnesia,	3.50	2.02
Potash,	22.10	14.16
Soda,	...	6.09
Chloride of potassium,	3.02	...
Chloride of sodium,	1.12	0.63
Phosphoric acid,	10.17	5.44
Sulphuric acid,	1.68	4.59
Silicic acid,	55.93	61.99
	100.00	100.00

Analysis of the Leaves.

Water,	58.15
Albuminous compounds,	4.20
Other organic matters,	30.75
Ash,	6.90
	100.00
Nitrogen,	0.64

The composition of the ash was as follows:—

Peroxide of iron,	0.86
Lime,	4.55
Magnesia,	1.57
Potash,	12.17
Chloride of sodium,	1.22
Phosphoric acid,	1.90
Sulphuric acid,	2.73
Silicic acid,	74.43
Charcoal,	1.07
	100.50

And after deduction of charcoal—

Peroxide of iron,	0.86
Lime,	4.57
Magnesia,	1.57
Potash,	12.23
Chloride of sodium,	1.22
Phosphoric acid,	1.91
Sulphuric acid,	2.79
Silicic acid,	74.85
	100.00

In calculating the acreable produce from these data, the roots which were not analysed, for the reason stated, require to be deducted:—

Entire produce per acre,	19,904 lb.
Roots,	1,238 „
	18,666 „

The following table gives, in pounds, the distribution of the different matters in the produce:—

	Ears.	Straw. Top Portion.	Straw. Lower Portion.	Leaves.	Total.
Water,	1267.39	2751.32	6301.81	1649.72	11970.24
Albuminous compounds,	62.36	102.55	129.19	119.15	413.25
Other organic matters,	594.38	1069.21	3267.28	872.38	5803.25
Ash,	37.07	82.92	163.72	195.75	479.26
	1961.20	4006.00	9862.00	2837.00	18666.00
Nitrogen,	10.00	16.42	20.71	18.15	55.28

Mineral matters, in pounds:—

	Ears.	Straw. Top Portion.	Straw. Lower Portion.	Leaves.	Total.
Peroxide of iron,	0.18	0.29	2.16	1.68	4.31
Lime,	1.03	1.76	6.16	8.94	17.89
Magnesia,	1.75	2.90	3.31	3.07	11.03
Potash,	6.78	18.32	23.18	23.95	72.23
Soda,	...	...	9.97	...	9.97
Chloride of potassium,	...	2.50	...	...	2.50
Chloride of sodium,	0.77	0.94	1.03	2.38	5.12
Phosphoric acid,	4.14	8.44	8.90	3.73	25.21
Sulphuric acid,	1.06	1.39	7.52	5.47	15.44
Silicic acid,	21.36	46.38	10.149	146.53	315.76
	37.07	82.92	163.72	195.75	479.46

The increased size of the plants during this stage, which permitted the examination of their individual parts, enables us to observe some interesting points. The ears which were in flower partake very largely of the characters of the straw, excepting that they contain a somewhat larger proportion of albuminous compounds. The similarity in the composition of the ash in both is also very remarkable, more particularly when the upper portion of the straw is compared with the ears. Between the two portions of the straw itself the difference is very marked. The lower part contains a

smaller amount of water and of albuminous compounds, by means of which it has acquired additional firmness to fit it for supporting the increased weight of the plant; and this is also indicated by the larger quantity of silicic acid in its ash. The abundance of phosphoric acid and potash contained in the upper portion of the straw is also well worthy of notice. As compared with the previous stage, it is to be noted that the plant has again become less succulent, the diminution in the percentage of water being very marked. So, likewise, there is a great diminution in the quantity of potash relatively to that of the other inorganic substances, although the total amount has increased. There is, however, a very great advance in the quantity of most of the other inorganic elements, and this is more especially the case as regards silicic acid, which is nearly five times as abundant as in the previous stage.

Fourth Stage, 27th August.

In this period the chief change which had taken place was in the filling of the ear; the grain, being now formed, had advanced to some extent. The changes which had occurred since the last period were also, in many respects, very remarkable.

Ears of 50 average plants weighed	3700	grs.
Straw, upper portion,	2440	,,
,, lower portion,	5290	,,
Leaves,	901	,,
Roots,	599	,,
	12,930	,,
Average weight of each plant,	258.6	,,
Produce of 5 square yards,	142,350	,,

Equal to 8 tons 15 cwt. 3 qrs. 2 lb. per acre, which was divided between the different parts of the plants as follows :—

Ears,	5633	lb.
Straw, upper portion,	3715	,,
,, lower portion,	8054	,,
Leaves,	1371	,,
Roots,	913	,,
Total,	19,686	,,

In the analysis of the ears at this stage it became of interest to separate the grain and chaff, but difficulty was found in accomplishing this when the plant was in the moist state, and a portion of the entire ear was therefore analysed in its natural condition; and another portion having been dried, the grains could then be separated. The ash analyses were made on the two portions separately, and the proportions of grain and chaff in the dry ears having been determined along with the percentage of ash in each, afforded the data for calculating the ash in the two together, which was useful for comparison with the results in the previous stage.

Water,	53.80
Albuminous compounds,	4.00
Other organic matters,	39.47
Ash,	2.73
	100.00
Nitrogen,	0.64

Proportion of grain and chaff (including stipe) in the dry ears:—

		Containing Ash.
Grain,	69.85	1.59
Chaff,	30.15	2.75
	100.00	4.34

	Grain.	Chaff.
Peroxide of iron,	0.41	0.89
Lime,	3.40	1.20
Magnesia,	5.16	1.77
Potash,	27.29	8.21
Soda,	...	0.68
Chloride of potassium,	2.01	...
Chloride of soda,	...	1.20
Phosphoric acid,	40.05	4.44
Sulphuric acid,	1.84	1.53
Silicic acid,	1.30	78.40
Charcoal,	18.09	2.75
	99.55	101.07

Recalculated, after deduction of charcoal, these will give—

	Grain.	Chaff.
Peroxide of iron,	0.50	0.91
Lime,	4.17	1.22
Magnesia,	6.34	1.80
Potash,	33.50	8.35
Soda,	...	0.69
Chloride of potassium,	2.47	...
Chloride of sodium,	...	1.22
Phosphoric acid,	49.16	4.53
Sulphuric acid,	2.26	1.56
Silicic acid,	1.60	79.74
	100.00	100.00

These data enable us to calculate the composition of 100 parts of the ash of the entire ear, which is as follows:—

Peroxide of iron,	0.75
Lime,	2.30
Magnesia,	3.46
Potash,	17.56
Soda,	0.44
Chloride of potassium,	0.91
Chloride of sodium,	0.77
Phosphoric acid,	20.88
Sulphuric acid,	1.82
Silicic acid,	51.11
	100.00

Analysis of the Straws.

	Upper portion.	Lower portion.
Water	52.68	54.71
Albuminous compounds,	1.56	1.31
Other organic matters,	42.44	42.07
Ash,	3.32	1.91
	100.00	100.00
Nitrogen,	0.25	0.21

The ash of these portions consisted of—

	Upper portion.	Lower portion.
Peroxide of iron,	0.46	1.89
Lime,	2.36	2.75
Magnesia,	1.84	1.80
Potash,	11.99	14.07
Soda,	...	1.19
Chloride of potassium,	4.20	...
Chloride of sodium,	0.08	3.84
Phosphoric acid,	2.97	3.41
Sulphuric acid,	2.27	3.20
Silicic acid,	70.34	65.04
Charcoal,	2.75	3.96
	99.26	101.15

With the charcoal deducted these give—

	Upper portion.	Lower portion.
Peroxide of iron,	0.49	1.95
Lime,	2.45	2.83
Magnesia,	1.90	1.85
Potash,	12.43	14.48
Soda,	...	1.22
Chloride of potassium,	4.35	...
Chloride of sodium,	0.08	3.95
Phosphoric acid,	3.07	3.51
Sulphuric acid,	2.66	3.29
Silicic acid,	72.57	66.92
	100.00	100.00

Analysis of the Leaves.

Water,	43.28
Albuminous compounds,	2.06
Other organic matters,	44.79
Ash,	9.87
	100.00
Nitrogen,	0.33

The ash contained—

Peroxide of iron,	0.91
Lime,	4.07
Magnesia,	1.80
Potash,	6.05
Chloride of potassium,	0.67
Carry forward,	13.50

Brought forward,	13.50
Chloride of sodium,	0.36
Phosphoric acid,	2.01
Sulphuric acid,	2.12
Silicic acid,	80.52
Charcoal,	2.34
	100.85

Which results give, after deduction of charcoal—

Peroxide of iron,	0.92
Lime,	4.12
Magnesia,	1.82
Potash,	6.21
Chloride of potassium,	0.69
Chloride of sodium,	0.37
Phosphoric acid,	2.04
Sulphuric acid,	2.15
Silicic acid,	81.68
	100.00

In calculating the acreable produce, we have, as before, to deduct from the total matters the weight of the roots (913 lb.), which leaves 18,773 lb. of the other parts of the plants, over which the different substances are distributed in the proportions given in the following table:—

		Straws.			
	Ears.	Upper.	Lower.	Leaves.	Total.
Water,	3030.55	1957.06	4406.34	593.47	9987.42
Albuminous compounds,	225.32	57.95	105.51	28.14	428.19
Other organic matters,	2223.35	1576.65	3388.32	614.07	7791.12
Ash,	153.78	123.34	153.83	135.32	566.27
	5633.00	3715.00	8054.00	1371.00	18773.00
Nitrogen,	36.05	9.28	16.91	4.52	66.76

Mineral Matters, in pounds.

	Ears.	Upper.	Lower.	Leaves.	Total.
Peroxide of iron,	1.15	0.60	3.04	1.24	6.03
Lime,	3.54	3.02	4.35	5.57	16.48
Magnesia,	5.32	2.34	2.85	2.46	12.98
Potash,	27.01	15.33	22.27	8.43	73.04
Soda,	0.68	...	1.87	...	2.55
Chloride of potassium,	1.40	5.35	...	0.93	7.68
Chloride of sodium,	1.18	0.13	6.07	0.50	7.88
Phosphoric acid,	32.11	3.78	5.40	2.76	44.05
Sulphuric acid,	2.80	3.28	5.06	2.91	14.05
Silicic acid,	78.59	89.50	102.92	110.52	381.53
	153.78	123.34	153.83	135.32	566.27

(To be concluded in next Number).

ON THE AGRICULTURE OF BERWICKSHIRE AND ROXBURGHSHIRE.

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[Premium—£25.]

(*Continued.*)

TENURE AND COVENANTS.

FROM the numerous instances given of high farming, it is scarcely necessary to say that all farms are held under *lease*. The general terms of lease are nineteen and twenty-one years. Some pastoral farmers have only nine years' lease; but, even for pastoral farms, farmers now consider that a longer term is essential. Surface-liming and close drains—improvements which will doubtless soon be carried out—to be executed by tenants, the latter must have longer time than nine years to be reimbursed for their outlay. Besides, there are few pastoral farms but what afford some land for cultivation, which can only be prudently and efficiently executed under a long lease. Apart from pastoral land, it is long leases that have, in a great measure, made Scottish farming what it really is. It is under leasehold tenure only that a farmer has security for his outlay, a landowner has his estate improved, and that agriculture progresses. This is no visionary statement, but is amply borne out by experience.

It is to be regretted that there are still, on many estates, conditions enforced in a contract between landlord and tenant which are equally hostile to both, as well as detrimental to agricultural progress. Old forms of leases are retained without reference to modern appliances, and the same form of covenant is made to suit high and low lying farms, and whether near to or remote from cities. The retention of such forms has only the plea of antiquity in its favour, and is totally at variance with an enlightened system of agriculture. It is not landlords who are generally to blame for the insertion of obsolete clauses in contracts, but factors, who are not well acquainted with the practical bearing of those forms they enforce, and through the enforcing of which they injure the interests of their employers. A lawyer, without practical knowledge of farming, is as incapacitated to draw up a contract for leasing a farm, as is the solely practical farmer to unravel the intricacies of law. Both are out of their proper sphere. The writer would by no means assert that such is the prevailing character of factors in the counties under consideration; on the contrary, it is with pleasure he can record that there are many factors who have the management of extensive estates in both counties, who are highly conversant with every department

of farming. Nor would he solely blame factors for retarding improvement. A few years ago, a factor in Roxburgh, well known for his practical acquaintance with farming, and the zeal with which he encouraged improvements, lost the factorship of one of the estates under his management, solely because his employer imagined, from the factor having erected a much-needed and commodious steading, and effected other improvements on a farm, that his capital had been needlessly squandered. But what was the actual result? Soon after this the farm was unexpectedly in the market for a tenant, and realised an annual increase of rental of £400 solely on account of these improvements. The following extract, too, taken verbatim from a form of lease, drawn up by the proprietor himself, of a farm in Berwickshire, which was let during the present season, shows that factors are not always to blame for restrictive covenants: "The tenant shall never sell, burn, or give away any straw, turnip, chaff, or dung, whether arising from crops grown or brought to the lands, but shall consume, by sheep, cattle, or horses on the farm, all the straw, turnips, &c.;" and again, "he shall also pay 2s. 6d. for each stone of straw, 25s. for each cartload of turnips, and 10s. for each cartload of dung he shall sell, burn, or carry off the farm." It is not uncommon, also, to meet with leases containing clauses prohibiting the growing of wheat, the selling of hay, potatoes, &c. Such prohibitory clauses, though exceptional, are not worthy of further comment, seeing they reflect anything but credit on this enlightened age.

A landlord ought, doubtless, to have some security against deterioration of property; but it is difficult to know how this can be realised otherwise than by securing good tenants. The most stringent conditions will never secure good farming on the one hand, nor prevent bad farming on the other. Moreover, the farmer who farms best for himself, farms well for the landlord also. Nay, more than this, no farmer can farm profitably who does not improve the farm in his occupancy. Towards the close of a lease, a farmer would no doubt farm differently, if he intended to leave his own farm, from what he would do if he anticipated a renewal of lease, just as farmers farm differently under a lease from under yearly tenancy. For the last five years of a lease a tenant ought, therefore, to be bound to a course of cropping, to prevent him from exhausting his farm. The commencement of these five years would be a proper time for landlord and tenant to try a renewal of their contract, which, if successful, would preclude the necessity of enforcing the restrictive conditions. And this induces reference to the many changes of tenants which, from landlords offering farms for public competition, have recently occurred in the Border counties as well as elsewhere. This system of advertising farms is not universal, but limited to some estates. It has, on the whole, little to commend it; and proprietors, as well as tenants, have often suffered from the

changes it has caused. In not a few cases, landlords, tempted by high offers, have accepted untried men as tenants, who, ignorant of their new occupation, have deteriorated the farms in their occupancy; and thus old tenants have frequently, by unsuitable offerers for land, been ousted from farms and districts endeared to them by long attachments and time-hallowed associations, and, while seeking to occupy new farms, have had to meet the same hostile influences that ejected them from their former holdings. There are, no doubt, also instances of farmers having become more energetic when they entered to a new farm, and the improvements effected by a new and enterprising tenant have frequently awakened the energies of a whole district. The great increase in the value of land during the last twenty years has doubtless induced many landlords to offer their farms for public competition. They were astounded with the great increase of rental which any farm in the market brought, and could form no estimate of the value of their own farms. When they made offers to the tenants to renew their leases, enormous rents were asked, and often as low rents offered, the tenants failing to appreciate the advantages which had accrued from the introduction of guano, railway accommodation, and higher prices for every description of produce. Thus an over-exaction on the one side, and too often an arrogated independence on the other, have caused many changes among tenants, and tended to break up that friendly intercourse which erewhile existed, and which ought to exist, between landlord and tenant. When a landlord is satisfied with his tenant, and, *vice versâ*, a renewal of contract ought invariably to be tried; failing which, a neutral party might be mutually chosen to value the farm and fix the rental. Were this carried out, the results would be satisfactory to all parties; landlords and tenants would avoid much expense and inconvenience, and the system of tenure would thus be made more perfect.

The usual term of entry to farms is at Whitsunday; on some estates the entry is at Martinmas. The terms of entry are better regulated, especially in Berwick, than in any other county. The incoming tenant gets the crop at valuation, without paying for the straw, which is steelbow. He likewise enters free to young grasses, ploughing of fallow, and often also to all the farmyard manure made from the preceding crop. This is just what ought to be; for although, in the event of his leaving the farm at the end of his lease, he is subject to the same way-going conditions, yet much of his capital is thus not locked up on the farm in *dead stock*, but is free to be laid out on spirited improvements. It is a serious drawback to English farming that an incoming tenant has not only to pay for grasses, straw, and manure in the yard, but also manure in the soil, whether real or fictitious, and for labour on the farm which he does not direct, and from which he often derives no benefit. The way-going tenant, indeed, is induced to give his land

as much horse-labour as possible, as he derives profit from it. The writer was over a farm in Surrey this season, where the valuation for labour on the fallow-break was £7 per acre, and the turnip crop which followed it was not worth £2. The labour consisted of frequent ploughings in spring—all injurious to the turnip crop—and harrowings and rollings, so that the incoming tenant was made to pay for labour which was actually detrimental to his interests. The only reason ever given for such a practice is that it is "the custom of the district." It is doubtless a *custom* which, so long as it is continued, will make English agriculture lag in the rear of progress. Very different is the system practised in the Border counties, which recognises that a soil highly conditioned is its original condition, and that in that condition it should be put by the proprietor into the tenant's hands.

SOCIAL AND INTELLECTUAL POSITION OF FARMERS.

At one time many of the Roxburgh and Berwick farmers were charged with having a too aristocratic leaning—or, in other words, with assuming a bearing quite above their occupation; but if ever there were grounds for such a charge, there are none existing now. Whenever a farmer's aspirations lead him to become ashamed of personally superintending every department of farming under him, he indeed then leaves *behind* him rather than espouses true nobility of farming. At one time, indeed, the duties of the farmer were so light, that his spare time was apt to lead him into extravagances beyond his means; seed-time and harvest were regarded as the only important seasons, and the only seasons in which the farmer gave close supervision. Farming has, however, totally changed, and sowing and reaping demand not more careful attention now than many other departments of husbandry. The arable farm is indeed now a great factory, ever in unceasing operation—of which seeds and store stock are the raw materials, the soil at once the machinery and motive-power, influenced, no doubt, by shower and sunshine; and which, like the twofold revolution of the earth, does not only every day perfect a process, but every succeeding day demands fresh duties essential to meet the requirements of the annual round of seasons; so far, therefore, from the farmer's occupation being, as some imagine, one of ease and apathy, it, on the contrary, demands the utmost care and incessant vigilance. A farmer must properly attend to the time and manner of ploughing his land—to the sowing of cereals, with its attendant operations of seeding with grasses, harrowing, and rolling. He must also carefully manage planting and manuring potatoes, the preparation of land for turnips, involving deep and dry autumn ploughing, the grubbing, cleaning, manuring, and seeding, besides the bustling requirements which the rapid growth of the young turnips demands in singling out by hand. This must usually be simul-

taneously executed with the weeding of grain and making of hay. And lastly, he must reap and store his grain, his turnips, and potatoes, sow wheat, drain and lime his fallows, and properly attend to the thrashing and preparing of grain; and simultaneously with all these, and much more than these, is the supervision of stock, the lambing season, sheep washing, shearing, and bathing, securing of food in winter for store, or fattening sheep or cattle; —if the farmer attend to these, he is engaged in an occupation not unworthy of the most unwearied industry, and which demands the exercise of the most vigorous energies. Happily, with this care and toil, there is, in viewing the progress of flocks, in witnessing crops nurtured by gentle showers and silent dews, in the hope of spring and the joy of harvest, a degree of pleasure seldom experienced in any other walk of life.

The Border farmer has long been proverbial for his shrewdness, and this characteristic qualification he still retains. Possessing a sound judgment, and cautious perhaps to an over-degree, he is a good salesman, and rarely makes dear purchases. In point of education and intelligence, as farmers, the Roxburgh and Berwick agriculturists occupy a high position, and bear a favourable comparison with those commercial classes who generally rank as of the same status. Several of them are well known as able contributors to agricultural literature, as well as acute in public business. The great majority of Border farmers, however, like their brethren generally, rather avoid than court publicity with their pen or speech, and prefer seeing their talents and actions turned to account in well-ordered farms. Doubtless, if modern farming requires more care and attention, a higher education and greater intelligence are required also. Dearer labour, higher rents, and greater competition for land—all demand a higher knowledge of manures, and a better acquaintance with those laws which influence the development of the resources of the soil. If the social position of a farmer is in any degree influenced by his means, it ought also to be higher now than formerly, as the high price of stock and the increased outlay on a farm require the farmer to have the double amount of capital for the same sized farm than he required formerly. Hence it is that rarely nowadays the occupant of a small farm is able to take a large holding.

In the Borders, as elsewhere, friendly intercourse between farmers has greatly changed. Formerly every valley contained, as it were, a separate community, which long neighbourhood, intercourse from childhood, and comparative isolation from other districts, had formed into almost one family. Unhappily, this brotherhood betwixt farmers and farmers' families has almost passed away, and the indifference with which neighbour recognises neighbour in towns is in some degree manifested by the inhabitants of rural vales. More frequent attendance at markets, railways, converting,

as it were, several valleys into one, and the more frequent changes of tenants, have all contributed to this result.

PEASANTRY.

With the exception of Hawick district, in the county of Roxburgh, both counties are exempt from those evils which generally accrue from close proximity to manufacturing towns—such as drawing away a rural population by the promise of higher wages, and the offer of work more congenial to the habits of females. Married ploughmen occupy cottages on the farm, are engaged by the year, and receive wages partly in money and partly in kind, and which rate from £30 to £40 annually. In Kelso district, they only receive about £6 of money, the rest of the wages being made up by oatmeal, barley, pease, free house, &c. In the Merse, hinds' wages consist of—

10 bolls oats, which, taking last year's price, amounts, at 22s., to	£11	0	0
4 bolls barley, at 26s., to	5	4	0
1 boll beans, at 17s. 6d., to	0	17	6
Potatoes,	5	0	0
Sheep-money,	5	0	0
Cow's keep,	7	0	0
Free house, garden, and carting of coals,	3	10	0
1 month's food during harvest,	0	15	0
	£38	6	6

In Lauderdale, and in the western part of Roxburgh, married ploughmen get £16 of money, 65 stones of oatmeal, keep of a cow, 1 boll of barley, 1200 yards of land for planting potatoes, free house, food during harvest, 1s. a-day, and harvest wages for bondagers. This, altogether, appears to be the best-regulated wages a ploughman can have. The cow is a great support to a family, while the owning of one tends to induce fixed habits in the owner. Meal and potatoes are thus procured, too, at the cheapest rate, and as they are always needed in a family, they are in any case as good as money, while in the case of an improvident wife they are better, as they are retained for food, when otherwise money would be spent. Beyond the necessary food-requirements which the farm produces, grain as wages instead of money seems unfair to a ploughman, as he is in ordinary circumstances entitled to the same reward for the same amount of labour. Unmarried ploughmen are also engaged by the year, and when boarded in the farm-house receive £20 of wages; when they have a "double hinding" with their fathers, they receive the same "gains." Piece-work is entirely confined to the mowing of hay and drainage, day-work to the usual manual work on the farm; and this is not strictly

day-work, as the workers (bondagers) are paid half-yearly wages by the ploughmen who board them, and these again paid the daily wages by the farmer. Without entering into the merits of piece and day work, a pretty extensive observation warrants the writer to say that the system, apart from boarding, of yearly or half-yearly engagements, is the best for employers and employed. A farmer to have his labour properly executed, and to be safe from those contingencies which result from sudden demands for, and a short supply of, labourers, must have in his daily employ, and have secured for the year, sufficient forces to meet the most urgent requirements of the farm.

In Roxburgh and Berwick the bondage system is universal, and complaints against it are not so loud as in other quarters. The population being chiefly rural, and the employment rural too, many of the bondagers are the daughters or sons of the ploughmen. In such cases bondage is a blessing, as it not only secures employment for the families of ploughmen, but, along with this, these are kept under the influence of parental example and reproof, instead of being sent abroad on the world, away from the parental eye, and at a time when they are most susceptible of good or evil. Besides, the boarding of one bondager in the house of each ploughman is less objectionable than several young men and women being boarded promiscuously in the farm kitchen. Probably the only injustice to ploughmen, in connection with the system of bondage, is, that the farmer does not free them from the risk of losing from paying unforeseen high wages, or an unexpected price for the bondagers' food. It seems only fair that the farmer should engage as well as pay the half-yearly wages to the bondagers, and likewise pay the ploughmen for the bondagers' board. In general the bondager receives 1s. for ten hours' work, and 10d. for short days in winter. Labourers get 15s. a-week. During the last twenty-five years wages have risen for married ploughmen from £25 to £35 a-year. The unmarried ploughmen, having board, from £15 a-year to £20; women, either for house or farm work, from £5 to £7, 10s. the summer half-year, and from £2 to £4 the winter half-year. Labourers from 10s. to 15s. a-week. The wages of stewards average nearly £50. Shepherds have sometimes part of money and part of sheep for their wages, and sometimes only the "keep" of a certain number of sheep, and again frequently money and "gains." Shepherds' wages average about £45.

In general the ploughmen are sober and industrious, and are skilful workmen, and generally faithful servants. Although recently more given to change, yet, on the whole, they are settled in their habits, and it is not uncommon to meet with a servant who has been thirty years under the same master. Like other counties of Scotland as well as in Great Britain, the amount of immorality which prevails among the labouring classes here is to

be deplored. A false reliance, however, on the registrar's returns of illegitimate children, has led some to unjustly wrong the inhabitants of rural districts, as if these furnished any data whereby to judge of the comparative morality of town and country. Illegitimacy is doubtless a proof of immorality, but it is a proof only of that which is revealed, not of that which is hidden. It is a significant fact, that rarely, if ever, has a female in the country, who had become the mother of an illegitimate child, sunk into the lowest depths of prostitution; on the contrary, many of such females, when they enter the married life, become faithful wives and exemplary mothers. This, of course, is no excuse of the sin, but it shows that rural immorality, as evidenced by illegitimate children, is immorality in its mildest form; whereas it is the immorality of cities—*that* immorality which does not reveal itself by illegitimate children—that is the greatest pest to society, and which lies at the lowest depths of moral degradation. Although morality, however, is in a lower state in towns than in rural districts, yet this is no palliation for the amount of immorality which prevails in the latter. Of late there has been much talk with respect to the means that should be employed to lessen this immorality, and elevate the condition of the labouring classes. Here, however, the matter rests, and no active steps have been yet taken to secure these ends. Were parents not to send their children so early from their parental homes to service; were the frequent changes of servants discouraged by masters; and were masters themselves to exhibit higher examples of morality, and were Sabbath schools, home education, and the freer circulation of a cheap religious literature promoted, their fruits would doubtless be manifested in a happy and moral peasantry.

THE FUTURE OF BORDER AGRICULTURE.

Much progress as has been made in the past, it would be rash to conclude that there is not room for greater agricultural progress in the future. Apart from the wide area of land that has yet to be ameliorated, and notwithstanding the high estimate given in the foregoing pages of Border agriculture generally, yet it must be admitted that there are still farms, even in the best-farmed districts, whose resources are not half developed. Drainage on these has still to be carried out, and whenever this is awanting every act of husbandry is ill performed. Even on the best-farmed farms, where a thorough system of drainage and liming has been carried out, and where summer-fallowing has been abandoned, and mixed tillage and stock adopted, there is a wide field for progress. There are still many steadings which do not afford sufficient accommodation for the requirements of the farm. Covered courts, essential not only for the comfort of cattle, but for economising manure, are yet the exceptions. Manure-heaps in the field require

to be more carefully covered with soil, to avoid waste from evaporation, and from a surface exposure to droughts; and all the refuse of a farm—decayed vegetation, excrements of whatever kind dropped about a steading, and dead animals of any description—more carefully gathered into the dunghill. In the fields, too, there is room for progress. The deep clay soils of the Merse, and the deep loams around Kelso, afford ample scope for *deeper cultivation.* Experience has not yet fixed the boundary-line of productiveness which crops do not pass, nor can it tell how great an increase of produce would accrue from the furnishing of increased facilities for the deeper and wider extension of the roots and rootlets of plants, as well as from promoting the wider action of atmospheric influence. Enough is known, however, from the enormous bulbs occasionally raised, and the gigantic cereal stalks, whose seeds are numbered by hundreds, occasionally produced, to warrant the conclusion that the present yield of crops might be very greatly increased. This doubtless cannot be obtained by *deeper cultivation* alone, but that operation must be accompanied by more *liberal manuring.* Both operations, indeed, must be simultaneously executed, and the more perfect the one is carried out, the greater the necessity for more perfectly executing the other.

A close alliance, too, between the science and the practice of agriculture is essential to progress. Apart from having sought her aid to test the qualities of artificial foods and manures, the farmer has virtually ignored the teaching of science, while the man of science has underrated practical farming, and has been too heedless of testing his theories by field practices. Hitherto, indeed, if the one has not sought to shun the other, their mutual recognition has been cold and reserved, and just like the formal shake of hands between two parties regardless of each other. To choose between the two, the practical agriculturist is doubtless the safer teacher, as he is invariably more successful than the merely scientific farmer. Advanced agriculture, however, demands that both should mutually assist and instruct the other, or rather that the two should be united in one, and the farmer have a scientific as well as practical knowledge of farming. He could then test his own manures, know the principles of drainage, avoid errors—at present prevalent—of putting crops on soils not suited to them, neither over nor under manure his fields, carefully husband what he now neglects, then, in a word, he would introduce a new era in agriculture.

PROCEEDINGS IN THE EDINBURGH VETERINARY COLLEGE.

By Professor DICK.

THE following is a brief summary of the cases of diseases, injuries, &c. registered in the clinical transactions of the Edinburgh Veterinary College, which have come under treatment during the first nine months of the present year. I beg to submit it to the members of the Highland Society, for the purpose of showing them a general outline of the amount of practice which the students attending the College have of obtaining a practical knowledge of their profession. Notes of the most interesting cases are taken by the more advanced pupils, who, under regulated direction and supervision, are allowed to have more or less personal charge and management; at the same time, every student has an opportunity of seeing almost all the cases, observing the symptoms, and witnessing the treatment, therapeutic and operative.

SUMMARY of CASES of DISEASE, ACCIDENT, &c., occurring amongst DOMESTICATED ANIMALS treated at the EDINBURGH VETERINARY COLLEGE, from 1st January to 30th September 1862.

	Horses.	Cattle and Sheep.	Dogs, &c.
Abscesses in various parts,	38	3	...
Anasarca,	...	...	2
Anus, inflammation of,	1	...	...
Apthæ,	1	...	...
„ Epizootic (murrain),	...	31	...
Ascites,	1	...	2
Bones, fractures and injuries of,	21	...	2
Bowels, derangement of,	2	...	...
Broken knees,	12	...	...
Bursæ, distension of, with lameness,	3	...	...
Catarrh and sore throat,	125	...	2
Castration,	13	1	2
Choking,	...	2	...
Chorea,	1	...	3
Chronic cough,	2	...	...
Colic,	87	...	...
Constitutional debility,	2	...	...
Constipation,	6	1	3
Cow-pox (Variola vaccinia),	...	6	...
Cracked heels,	10	...	...
Curb, with lameness,	11	...	...
Diabetes (Polyuria),	23	...	...
Diarrhœa,	4	1	2
Deafness (partial),	1	...	...
Distemper,	...	...	7
Docking,	4	...	...
Ear, diseases and injuries of,	3	...	1

	Horses.	Cattle and Sheep.	Dogs, &c.
Epilepsy, ...	...	...	4
Epistaxis, ...	2	...	...
Enteritis, ...	6	1	2
Examinations as to soundness, .	149	103	...
" " pregnancy, .	...	1	...
Eyes, diseases and injuries of, .	15	...	5
Eyelids, inversion of, . . .	...	...	3
" injuries of, . . .	3	...	1
Fardel bound, . . .	...	1	...
Feet, wounds and bruises of, . .	104	...	...
" canker in, . . .	5	...	...
" corns in, with lameness, .	16	...	...
" inflammation of (Laminitis), .	18	1	...
" navicular disease in, . .	125	...	...
" contraction in, . . .	1	...	...
" pricks from nails, . .	31	...	...
" pumiced, . . .	3	...	...
" quittors, ...	7	...	...
" sandcracks, . . .	22	...	...
" seedy-toe, . . .	2	...	...
" side-bones, with lameness, .	9	...	...
" thrushes, " " . .	3	...	...
Frost-bites (legs), . . .	2	...	...
Fistula and ulcers, . . .	20	...	...
Glanders, ...	1	...	...
Grease, ...	14	...	...
Gonorrhœa, ...	...	1	1
Heart, diseases of, . . .	9	...	...
Hernia, ...	1	...	1
Hysteritis, ...	...	2	...
Indigestion, chronic and acute, .	21	2	...
Influenza, ...	75	...	...
Knuckling over (foals), . .	3	...	...
Lameness, elbow-joint, . .	4	...	...
" coffin-joint, . .	1	...	...
" coronet, . . .	5	...	...
" fetlock-joint, . .	10	...	...
" hip, . . .	35	...	...
" hock, . . .	21	2	...
" knee, . . .	10	...	...
" pastern, . . .	3	...	...
" shoulder, . . .	10	...	...
" stifle, . . .	12	...	...
Mammitis, ...	...	2	...
Matter in frontal sinus, . .	1	...	...
Nasal gleet, ...	11	...	...
Navel, disease of, . . .	1	...	...
Osteo sarcoma, . . .	...	1	...
Over-exertion, . . .	1	...	...
Paralysis, ...	6	1	3
Parturient fever, . . .	...	2	...
Parturition, difficult, . . .	...	4	1
Phthysis pulmonalis, . . .	...	...	2

	Horses.	Cattle and Sheep.	Dogs, &c.
Phrenitis,	2	...	...
Placenta, removing,	...	1	...
Pleurisy, pneumonia, &c.,	31	...	...
Pleura-pneumonia,	...	5	...
Poll evil,	2	...	...
Prolapsus ani,	...	...	1
Poisoning, suspected cases of,	...	...	56
Pediculi (Lice),	1	...	...
Quidding,	5	...	...
Rachitis,	...	...	3
Roaring, thick and broken wind,	21	...	...
Ringbones, with lameness,	10	...	...
Rheumatism,	4	1	2
Scalded legs,	3	...	...
Shivering fits,	2	...	...
Schirrhus of the cord,	3	...	...
Spavin, with lameness,	37	...	...
Splints, ,, ,,	24	...	...
Sore backs,	3	...	...
,, shins,	1	...	...
Staggers,	3	...	...
Strangury,	1	1	...
Scab (sheep),	...	25	...
Skin, diseases of,	38	...	10
Spine, injury of,	4	...	...
Stomach, distension of,	1	...	...
Stone in the bladder,	1	...	...
Sprains, tendons, and ligaments,	49	1	...
,, muscles,	10	...	...
Strangles,	15	...	...
Stringhalt,	5	...	...
Superpurgation,	4	...	...
Suppression of urine,	1	...	...
Swelled sheath,	2	...	...
,, joints,	2	...	...
Teeth, diseases, &c. of,	15	1	3
Tenotomy,	1	...	...
Tetanus,	3	...	...
Thoropin and sprung hock,	3	...	...
Treads, overreaches, &c.,	3	...	...
Tumors, various,	29	2	4
Vomition,	...	...	1
Weed, inflammation of absorbents,	32	...	...
Worms, intestinal,	4	...	...
Wounds and bruises other than feet,	73	...	3
Extracting rifle-bullet from dog's neck,	...	...	1
Teats, injuries, &c. of,	...	2	...

GENERAL ABSTRACT.

Cases amongst horses,	1602
,, ,, neat cattle and sheep,	208
,, ,, dogs, cats, &c.	133
	1943

Remarks on the cases, I think, become the less necessary, as the list speaks for itself. It will be seen that the diseases which generally prevailed were influenza and common catarrhs, in most cases combined with sore throats. These, although ranging over the whole nine months, principally occurred in the spring. Their prevalence has without doubt been due to the changeable character of the weather, sudden transitions from heat to cold, and *vice versâ*. The type of influenza has been that of a low typhoid form, requiring careful nursing as much, or more, than active medical treatment. The symptoms of the disease are unfortunately so well known, that I think it scarcely necessary for me to recapitulate them. The plan of treatment I have found most successful is good warm clothing, plenty of fresh air, with stimulants and mild tonics, of which, perhaps, the best is the sulphate of iron. The treatment of catarrh and sore throat is simply to apply to the throat a mild blister, and administer a fever drench and a gentle laxative.

During the spring months, diabetes, or, more properly speaking, excessive staling and great thirst was of frequent occurrence. In the majority of cases this was traced to the horses having been fed upon imported hay, which, in all probability, had got damp and musty during its transit. This disease, in the majority of cases, I have found to be due either to the animals being fed on musty hay, or on musty or kiln-dried oats; thus showing the necessity for owners of horses exercising some care in the purchase of forage. The disease, although not of a fatal character, is one that speedily reduces both the condition and strength of the horse. The treatment consists chiefly in the administration of large doses of iodine combined with opium, following this up with vegetable tonics.

About the end of summer several cases of rather a peculiar nature came under treatment. The owners complained that the horses, although eating their food, seemed unwilling or unable to swallow it—in fact, quidding it. On examining the teeth, mouth, and pharynx, nothing seemed amiss. Finding, however, that in every case the animal had been fed upon cut grass, I was led to the belief that it was connected with, or dependent upon, the food having assumed a rank nature, caused by, or consequent upon, the wetness of the season. The treatment adopted was change of food from grass to good hay, and the administration of mild tonics, which in all instances proved successful. During the end of summer and in autumn, weed, or inflammation of the absorbents, has been the most common form of disease prevailing, more especially amongst farm horses. This disease is, I believe, in most cases caused by improper feeding, combined with want of exercise. In the majority of cases it will be found that this disease makes its appearance on Monday mornings. On inquiry it will be found that the animal, from the Saturday evening until the Monday morning, has had

as much food as he can possibly eat; this, combined with standing without exercise, appears to be the cause of the disease. Another disease, which occurs frequently on Sunday evenings or on Monday mornings, is colic, and is without doubt brought about by the same causes as weed—namely, improper feeding and want of exercise.

Of the three cases of tetanus brought under treatment, one recovered. This, a case of traumatic, was induced by a deep saddle-wound in the back. The horse was brought into the College hospital from the neighbourhood of town. After placing him in a loose-box, and ordering perfect quiet, a large dose of purgative medicine was administered, extract of belladonna applied to the wound, and the animal placed in slings.

After persevering for some weeks in the use of belladonna, both externally and internally, the animal was sufficiently recovered to return home, and is at the present time working as well as any horse can do. The others were destroyed by the owners, who considered it an act of mercy to put a period to the agony and suffering of the poor animals, as affording the only source of relief. Amongst the great number of cases, I am happy to say we had but one of the fatal and loathsome disease, glanders; it occurred in a horse bought at some country fair by a carter. The animal was of course immediately destroyed. During the nine months we had, however, several cases resembling glanders, where there was a discharge from either one or both nostrils: the discharge, however, on examination, was found to proceed either from chronic nasal gleet, or from diseased teeth. All by judicious treatment, however, recovered.

Amongst the cases of fractures and injuries of bones, the most frequent were fractures of the bones of the pelvis, chiefly the shaft or anterior spine of the ileum and ischium. These, in most instances, were caused either by the animals slipping during the frost, or falling in drawing heavy loads up some of the steep slippery streets with which our city so plentifully abounds. In making an examination for fracture of this bone, care must be taken not to confound an accident, which in most cases will recover with time and patience, with a disease of the arteries supplying the extremities with blood, and said to be incurable.

During the nine months several severe cases of wounds have come under treatment, to a few only of which I will draw attention. One occurred to a bay horse, which, having become restive, tried to break away from his driver, and in doing so got his head over the railings enclosing the south side of the Old Western Bank, at the east end of Rose Street. The horse, in struggling, stuck the point of one of the rails behind the angle of his jaw, and in struggling to free himself fell, the whole weight of his body being suspended by the head on the rail, the rail becoming so firmly embedded by the weight, added to the struggles, as to require the aid of a black-

smith, with a fore-hammer and chisel, to break off the head of the rail before the poor animal could be released. The head of the rail, which was the shape of a spear-head, measuring about 8 inches long, and 4 at its broadest part, as soon as broken off, disappeared in the wound. The horse was brought to the yard of the College; and on exploring the wound, which was, as already stated, just at the angle of the jaw, passing under the posterior part of the parotid gland, and penetrating into the guttural pouch. The piece of iron was found situated between the jaw and pharynx, dividing in its course several of the smaller branches of the carotid artery. Owing, however, to the vessels being so lacerated, there was little or no hemorrhage. Mr Strangeways, my assistant, with the aid of my foreman smith, was, after using no small amount of force, and exercising great caution, enabled to remove it. After the removal, the wound was stitched up with metallic sutures; cold cloths were applied; and, strange to say, with the exception of a little swelling of the gland, the hole healed up without a single bad consequence.

Another severe case of wound between the jaws, was, like the former, caused by part of the head of an iron railing. In this case, the horse, when brought to the yard, had been wounded several weeks previously. The intermaxillary space was found much swollen, with a suppurating wound in the centre, on exploring which the spike was found. It was removed, the wound dressed, and all went on well.

Another peculiar case of a wound was that of a dog brought to the College. The boy in charge stated that, about ten days previously, the dog, whilst running in Hunters' Bog during the rifle-practice of the volunteers, received a wound from a bullet which had struck a stone and ricocheted a considerable distance to the side of the target. The wound was at the upper part of the neck; and, on introducing a probe, a sinus was traced down several inches, and at the bottom was found a hard substance, which could also be felt externally close to the front of the sternum; the skin at the place was cut through, and with the aid of a pair of bullet-forceps an Enfield bullet was removed, after which the dog speedily recovered.

Amongst neat cattle the most prevailing disease has been epizootic apthæ, or murrain. In dairies it has been very common; in fact, scarcely one in the country has escaped it. This disease, although not of a fatal kind, is one which, I daresay, most of your agricultural readers know to their cost often entails frightful losses, more from its after consequences, perhaps, than from the disease itself. The most common, and most dreaded sequel, amongst milch cows, being garget, or inflammation of the udder, which involves, in many instances, the loss of one or more of the quarters of the udder. Murrain, being one of those diseases that has a

certain course to run, requires little or no medical treatment, all that is required being to keep the animal clean, and attend to her comfort; and, if a milch cow, to strictly enforce the proper drawing of her teats, so as to prevent, if possible, the inflammation of the udder. Should the teats be sore, a little oil, or soothing ointment, should be applied; and the mouth, if affected, dressed with salt or a weak solution of alum.

The only other disease I intend to notice, as occurring amongst cattle, is variola vaccinia, or cow-pox, a few cases of which have lately come under my notice. This disease, as almost every one knows, is a very benignant one, and runs its course without any bad consequences, except producing soreness of the teats. Cow-pox is, I believe, raging to a considerable extent both in the counties of Mid-Lothian and Fife, and offers, I think, a good opportunity to the members of the medical profession for laying in a stock of good healthy vaccine matter. The appearance of this disease about the same time as that of the pox among sheep in the southern counties of England, and the small-pox amongst the people, leads me to the opinion that all of these forms of variola are due to, or caused by, atmospheric influences, and not to contagion, as some would lead us to believe.

REPORT ON IMPROVEMENTS ON CULVENNAN, WIGTOWNSHIRE.

By JAMES COWIE, late Haulkerton Mains, Laurencekirk.

[Premium—The Gold Medal.]

THIS property is situated in the parish of Kirkcowan, and county of Wigtown, and consists of 589 acres, 198 of which are hill pasture. With exception of the latter, the greater portion is either improved or improvable, and lies at an elevation of from 300 to 350 feet above the level of the sea. The climate is moist and tolerably early, being equal in this respect to other inland districts of Scotland.

About twenty years previous to 1850, the estate was under the management of a person who was possessed of neither practical knowledge, nor means to improve it. When the reporter came into possession of it in 1850, it was occupied by two tenants, whose rents were £40 and £35 respectively. They were a fair specimen of what many of the tenants are in such districts, where there is neither much skill nor energy displayed. In the absence of the factor, already referred to, who had visited the property only twice or thrice during his twenty years' charge, if they had just cause of complaint for want of countenance or encouragement, in making

any improvements for the benefit of themselves and the property, they could not plead captious interference in the management of it. Hence it will not surprise any one acquainted with these parts, to be told of the wretched condition of the buildings and lands at the period referred to. The reporter cannot soon forget his impressions on his first visit. To say nothing of the habiliments and personal appearance of the tenants and their families; the stunted and starved-like look of the live stock; the filthy state of the little detached patches of arable land; and the general aspect of the profitless waste which everywhere met his eye, revealed to him a state of matters anything but satisfactory to contemplate.

At that time the land, capable of being cropped, could not have been easily ascertained, owing to its detached state; but it was not above 56 acres, although, according to the plan of the estate, it showed considerably more; but this arose from a great part of the meadow, which still lay in its natural state, having been reckoned arable. The land did not, as in some districts many years ago, lie in narrow stripes of corn and grass alternately, or, as it is termed, "rig and bauk;" but every field was more or less covered with boulders and other stones, or interspersed with unimproved patches of ground. The meadows, and especially the moss, presented in general a most uninviting appearance. A great portion of the moss here and there had been dug for fuel and other purposes, and so formed a very unequal surface. The whole waste ground was very wet, some of it so much so, that, unless in dry weather, it was unfit to bear the tread of any quadruped. The herbage it could have was of the most scanty and unsavoury description. Two small rivulets ran through the low lands in a circuitous route, in ruts which contained only the usual run of water, and in a rainy time nearly the whole of the lower portions were consequently flooded. Although stones were abundant, there were no dykes, except a few dilapidated ones only 2 to 3 feet high, partially surrounding two or three small fields, and a very insufficient one round the hill, which was by no means proof against trespass by sheep. The buildings were just in keeping with the rest of the subjects. The mason-work consisted of dry-stone walls, the dwelling-houses having got a coating of lime sufficient to exclude the daylight and the wind. The roofs consisted of rafters, in size from the thin slab to the tree's natural rotundity; twisted, broken, and patched; moth-eaten—under every stage of dilapidation which time and weather could, by combination, effect. The covering, of course, was thatch, and this the most sparing in quantity, and indifferent in quality.

In speaking of the primitive-like condition of this property, the Reporter would remark that the same description would be applicable to many other properties in the upland districts of this county and that of Ayr.

The initiatory step to change the state of matters thus briefly detailed, was to part with the tenants whose leases had expired, and who required little or no persuasion to leave. As there was hardly a house on the premises fit to accommodate either man or beast, the building of suitable houses was immediately set about. It was determined to divide the property into two farms, the larger to consist of 220 acres, and the smaller 116 acres, and a smithy tack of from 50 to 60 acres, the nearest blacksmith being 3½ miles distant. The Reporter drew plans for a dwelling-house and a steading of offices for the larger farm, which were erected in the course of the first 18 months. The house is of one storey, with attics, having storm-windows, and contains, besides other conveniences, five rooms and a kitchen. It is substantially built, and is well finished, and cost, exclusive of carriages, £120. The steading is sufficiently large for the farm, or any other one of like size, and is found to be most convenient, and to answer every expectation formed of it as a new style of building. The cost of its erection was under £400. A thrashing-mill was erected at the same time, driven by water, which was brought from a running stream more than a mile distant. The expense of machinery, cutting water-courses, dam, ark, &c., was about £150. Tracts had to be cut for the two rivulets in straight courses, and of sufficient dimensions to contain the water at all times. The ground was then laid out in proper-sized fields, as far as this could be done. Roads to intersect these were made, and as abundance of gravel was got at hand, these were made at little expense beyond carting.

The important matter of drainage was now gone about. With the exception of 15 or 20 acres, there was a bottom, generally a mixture of clay and gravel, sometimes not very firm, found at the depth of from 1 to 3 feet. The deep portion is what is known as flow-moss, which is perhaps the most expensive and difficult of all mosses to improve. In draining this, it was found necessary to put in wedge-drains, at from 15 to 18 feet apart. The depth of these varied from 4 to 6 feet, depending upon water being found in the bottom. It was often got, especially at the extreme depth, in such quantities as to prevent, for a time, the completion of the drain. The wedges were formed out of the tough surface, and jammed into the drains, leaving an opening at the bottom of 9 to 12 inches. These drains were opened and closed at an expense of 2s. 3d. to 2s. 6d. per imperial chain. In other portions of meadow and moss the drains were cut at the same distance apart, and averaged 3½ feet deep, into which either two-inch pipes or tiles with soles were put, the latter having been found to be more efficient, and less liable to be choked. These drains cost the same as the others, exclusive of tiles. With the exception of the meadow and bare moss, the surface, sometimes before and sometimes after draining, was pared at the rate of £1 per acre; an operation which was found to be essential for after

purposes. These parings were occasionally burned, and the ashes spread over the soil, but were more commonly used in filling up holes and ruts. The ground in many parts was so rough and uneven on the surface, that a process of levelling, both by plough and spade, had at this stage to be done.

Before attempting to plough each field as it was got drained, the great bulk of the loose and set-fast stones were removed, many of which, especially the latter, had to be blasted. The carting of field-stones is always a heavy and tedious job, which becomes doubly so when the ground, as in this case, is mostly soft. The quantity of stones varied from a few tons to 200 tons per acre. They were reckoned to amount in all to upwards of 5000 tons, besides some hundreds of loads of fast-stones dug out of the arable land. The stones, as they were carted or removed on sledges, were laid down on the spots marked out for house or dyke buildings, and thus a relifting of them was saved.

Sand, of which there are some fine banks on the property, was then carted and spread over the moss, at the rate of from 300 to 500 loads per acre, which so far supplied the want of silica in the moss, and proved so essential, that corn would not, for some seasons at first, grow without it. This stood in place of lime, and the sand may be considered more permanent in its effects, if not so speedy in its results. Reckoning a man and a pair of horses at 10s. per day, the sanding would cost about £1 per acre.

The land was thus so far in a fit state for ploughing, and a most serious undertaking this for the most part proved to be, notwithstanding that the best hands, horses, and implements were employed. Although the drainage was considered so far complete, the superabundance of moisture in, and retentive nature of, these soils is such, that the action of the drains is not soon sensibly felt. Instead of allowing the ground to undergo the necessarily slow percolating process, the Reporter, like too many eager improvers desirous for a speedy return of his outlay, started the plough while the ground was still in a comparatively wet state, and before there was anything like a firm footing got in much of it for the horses. The inevitable consequence was that the work was more difficult in accomplishing, and worse done, than it ought to have been. And while confession of error is made in one respect, it may be as well here to make a second admission in the same direction for a warning to others. When the ploughing was somehow or anyhow got accomplished, instead of deferring a season, or even more, to give time for the still tough surface to rot, the seed was sown immediately, or as soon as seed-time came. The harrows might have almost as well been turned upon as many furrows composed of india-rubber for all the good they did in reducing the new soil into a mould. They accordingly tossed and tumbled about alternately in a verticle and zig-zag manner, quite violent at times. The half of the seed was not consequently got covered in a proper manner, and the

guano, of which there were $1\frac{1}{2}$ cwt. to 2 cwt. sown per acre, had no soil to incorporate with. In these circumstances it was astonishing to see the thickness and healthy look of the braird; but this appearance proved very deceptive, for, at a certain stage, and when the hot weather came in, one stem after another withered and died, and frequently left little or nothing to reap. This did not occur on one field or on one occasion, but in every case on the black tough-surfaced moss where time was not allowed to rot it. Experience, however, taught a useful lesson, and the Reporter, instead of grasping at what proved only the *shadow* of rapid returns, profited latterly more by patiently waiting nature's work to assist that of art, and he found matters both more pleasant and more profitable.

It has been found that trenching moss does not produce better, nor indeed so good crops, for the first year or two at all events, as simply ploughing it. This must be owing to the spade burying too effectually the weather-winnowed surface, which the elements have conspired to render in some measure productive, and exposing the inert underground. Hence, wherever the plough could penetrate for stones, the spade was never employed, and this happened over only about 20 acres, which were trenched 14 inches deep at an expense of £10 per acre.

There has hitherto been no regular system of cropping adopted on the new land. Two or three oat crops in succession were generally taken until it was sufficiently reduced, that a mould could be had for taking a green crop. It has invariably been found that the land produced not only better, but sooner came into a workable state, the more liberally it was sanded, both by a first and second application to the successive crops.

As regards the manuring of the new soil, although various kinds of artificial manures were tried by way of experiment, guano and dissolved bones were found, on the whole, to be most beneficial for the grain crops, and farmyard dung for the green crops. In order to get almost the whole of it thus applied, a preparation of moss, saturated with urine, was employed to the hard land, and what was formerly cultivated. The following method was adopted in this preparation:—The moss was removed from its bed and heaped up, where it was allowed to lie for a year or two to dry and winnow. It was then carted into the bottom of the cattle-sheds to the depth of several feet, where there was a tank which collected the urine from the byres. This was afterwards spread over the surface of the moss and dung from time to time. The moss thus prepared, was afterwards carted out and put in the drills like ordinary dung, supplemented with a very little guano, and the green crop was not only good, but the after-crops benefited evidently from this peculiar manuring, which was thus both inexpensive and remunerative.

In the third year of his proprietorship, the Reporter extended his improving operations to the smaller farm of 116 acres, on which he built a suitable dwelling-house and steading of offices at a cost of £350. Last of all, the smithy tack was taken in hand. After the usual land improvements were gone about, a new house was built at an expense of £100, and other £50 were expended in repairing the old steading. Four servants' cottages were built four years ago, each having a kitchen and two bed-closets. There is a lobby, a pantry, and a recess for a bed in the kitchen. The bedrooms are plaster-lathed, and all the rooms are floored with tile flags, and are otherwise well finished. The accommodation is sufficient for an ordinary sized family. The cost of the four houses, built two and two according to the plan No. 1, was £170. Carriages and the value of the building stones and granite blocks, as in all the other calculations on buildings, are excluded.

While the other works were going on, stone dykes, 4½ to 5 feet high, were erected round the fields to the extent of from 300 to 400 chains, the cost of which, excluding carriages, was 7s., and including these, 16s. per chain.

With the exception of a round knoll and a few acres for shelter to the dwellings, no trees have been planted.

Two years ago, at the conclusion of the improvements, at least so far as he felt inclined personally to follow them out, the Reporter employed an experienced valuator in the district to survey and value the estate, with the view to its being let. As will be seen by the new plan, the arable acres are now increased from 56 to upwards of 300.

The farms, after being advertised, were let for nineteen years to three tenants, at rents respectively under the valuation. At the same time, the game was let for ten years to a neighbouring proprietor. The total outlay for buildings, improvements of all kinds, labour, tear and wear, &c., has been about £4000, and the gross rental is £260, the rent being more than trebled.

In speaking of the returns yielded by the new land in corn and green crops, the Reporter may state in general terms that these depended so much on the state of the ground in regard to mould, also the nature of the seasons, whether dry or wet, as not to admit of any certain criterion to guide one in the propriety of engaging in the work. Experience comes to one's hand often too late; but a practised eye, on seeing little beyond the natural herbage, ought to be able to form a pretty correct idea of the probable fertility of the ground. In any event, however, the science of chemistry can be called in to one's aid. As an indication for present purposes and for future guidance, the Reporter, in 1855, procured the annexed analysis of the two most prevalent soils he had already reclaimed, or wished to reclaim. These were the peat-moss No. 1, and

meadow, so-called, No. 2. It will be seen that No. 1 yielded 92.54 per cent of vegetable matter, the remainder being inorganic, or earthy matter.* Owing to the presence of so much vegetable matter, it must be apparent that no crop could grow and come to perfection. Clay would, no doubt, be the best application, but sand is likewise very efficacious, and is generally more accessible in moorland districts. Wherever clay or sand, or some such material, being largely charged with silica, cannot be had, the propriety in an economical sense, of attempting to reclaim such soils as No. 1, is very doubtful, unless under peculiar circumstances, occasioned by locality, climate, or otherwise. At the best, in this case, large supplies of lime and manures would be absolutely necessary, which, with previous and subsequent expenditure, incur an almost unwarrantable outlay. It must be borne in mind that, although these mosses may be found in great part shallow enough for drains to bottom, they are seldom uniformly so, but are interspersed with deep spongy mosses. In carrying drains through these, there is no better method than by laying the tiles on long slabs of wood. Wedge, in continuation of tile drains, is always to be avoided. They are, from almost their outset, more or less insecure; and in any case not permanent, as the Reporter has already found in no small measure, by the frequent redraining found necessary. Indeed, no system of drainage on soft moss can be said to be permanent; constant stoppages here and there occur under the most careful management. The Reporter succeeded after sand-

* The chemical composition of peat-soils, of course, varies in the proportions of their constituents. The following analysis of a specimen of an entirely barren peat-moss in a perfectly dry state, will give the farmer a tolerable idea of their general composition :—

Fine siliceous sand,	29 parts.
Inert vegetable matter,	289 "
Alumina,	14 "
Oxide of iron,	30 "
Soluble vegetable matter,	11 "
Sulphate of lime (gypsum),	12 "
Loss,	15 "
	400 "

Such is the composition of a barren peat-moss. The analysis of an active, or fertile peat-moss, with which it will be well to compare it, gave the following results, after being also dried :—

Fine siliceous sand,	156 parts.
Unaltered vegetable matter,	2 "
Decomposing do. do.,	110 "
Silica (flint),	102 "
Alumina (clay),	16 "
Oxide of iron,	4 "
Soluble vegetable and saline matter,	4 "
Muriate of lime,	4 "
Loss,	2 "
	400 "

ing this moss by the hundred of loads to the acre, in getting it to produce, sometimes the second, but more generally the third year, two to four quarters of light oats an acre.* There was often plenty of straw, but it had no strength to withstand the buffeting of the weather, and when once laid, especially at an early period, it did little good towards ripening in the corn. Turnips and grass, especially clover, are not reliable crops for some years, unless the ground has been limed as well as sanded; but good potatoes can be raised if got in in good time, and manured from the dung-hill of the farm. Mangold, and drumhead cabbages were tried on a small scale with success.

No. 2 is a soil of a different and more hopeful texture. If properly drained and ploughed, it will produce both corn and green crops of all kinds after the first year or two in abundance, and that, too, without any mixture of other soil, and with a very moderate supply of manures.

Independently of the prospect of being remunerated in a pecuniary sense for the outlay, the personal fatigue, and occasionally mental anxiety, undergone in the course of turning this little property almost upside down, the Reporter has the satisfaction of seeing his labours crowned with success by, in some degree at least, "turning a desert into a fruitful field," and in providing, he has reason to believe, comfortable homes to several families, where previously poverty and filth had their abode.

Extract of Certificate dated 1854 *regarding the Improvements on Culvennan, Wigtownshire, by* ALEXANDER M'CAW, Esq., *Government Inspector of Drainage.*

"On my last inspection, I was accompanied by Mr Nicol, lately appointed Government Inspector, and a gentleman from Sir James Hay's estate, the former with a view to see the system of moss drainage, the latter to see the improvements generally. We made a very minute inspection, opening up drains in suspicious parts where one doubted the declivity to allow sufficient rapid discharge, and in every case we found everything correct on this head, as well as the workmanship highly satisfactory in the execution. Mr Nicol, on this account, was very desirous to engage the same party to execute similar works at Craighlaw. The fencing, trenching, and clearing the surface, with other improvements, were to me quite satisfactory, and the gentlemen who accompanied me expressed themselves highly pleased. We examined the steading, and were delighted with the ample accommodation and substantial nature of the buildings.

(Signed) "ALEXANDER M'CAW."

* Black Tartarian oats were tried, but not found to answer better than, or so well as, the common white varieties.

REPORT ON TOP-DRESSING FOR PASTURE.

By W. S. Macdonald, Springkell, Ecclefechan.

[Premium—The Medium Gold Medal.]

The prosperity of the general community, and particularly of that portion of it whose bones and sinews are the bulwark of our nation, has of late years been such as to have contributed on a large scale to the consumption of our beef and mutton. Notwithstanding the great fears entertained, a few years ago, that British agriculture would be undersold, that land would depreciate in value, and that beef and mutton would be purchased for a trifle, thanks to the general prosperity of our country, in which all classes have shared, these fears have not been realised. Land has steadily year by year risen in value; beef and mutton also command high prices. The energy and skill of the agriculturist have thus been quickened and taxed to produce larger returns to meet the advancing rents and growing consumption; hence, through the aid of science, much progress has of late years been made in the primitive art of agriculture. Still, much remains to be done, and there are thousands upon thousands of acres in Great Britain now lying in a state of nature, and comparatively worthless, that could be rendered valuable and productive through means of drainage and top-dressing.

Previous to the year 1856, only some two or three of the Springkell grass parks, which extend to about 500 statute acres, were thorough-drained, and, with the exception of a single field, which is naturally dry, every field required more or less drainage.

As the basis of the present report, 6 enclosures are selected out of 22, part of these old grass-fields, and part recently broken up and sown out with a mixture of natural and artificial grasses, the whole being drained where drainage was required. From the difficulty of comparing or estimating the produce or value of top-dressed land depastured with stock, it is necessary to enter somewhat into detail, giving the cost of every operation, and particularly so that most of the fields have been let from year to year by public roup as grass parks. The management and results of the old grass-lands shall be treated first.

OLD GRASS-FIELDS, NOS. I., II., III., AND IV.

No. I. extends to about 56 acres 910 dec.; has been let as a grass park for a period of years, and for 13 years previous to 1857 the average rent was £152, 17s. In the spring of that year a sum of £152, 17s. 10d. was expended in draining it. It was let in April up till Martinmas following for £173. During the following winter and spring the field was top-dressed with 3721 bushels of lime —8 bushels of lime are equal to 1 ton—at a cost of £201, 11s. 1d.,

including cartage and every other expense, and let for season 1858 at a rent of £165. The weather was very dry when the field was let, and the lime lying so thick on the surface that grass-takers were afraid the grass would have a difficulty in getting through; but by the end of June the results were astonishing. The rent realised for season 1859 was £171; for 1860, £230; and for 1861, £201.* This is now a splendid field, and the moss has entirely disappeared, which is chiefly due to the lime-dressing and harrowing.

No. II. contains about 20 acres 581 dec., 5 acres of which are nearly covered with old trees. This field is naturally dry. It was let for 13 years, previous to 1857, at an average rent of £49. In the spring of that year, 15 acres of it were dressed with about 2 cwt. of dissolved bones and guano per acre, mixed together and sown about the end of March. The field was not let for season 1857. For season 1858 it let at a rent of £72, for season 1859 at a rent of £50. The following winter and spring the same 15 acres of it were top-dressed with 1450 bushels of lime, at a cost of £77, 10s. 10d., and let for season 1860 at a rent of £71, and for season 1861 at a rent of £70. This field was also very full of moss, which has entirely disappeared since being limed and harrowed, and the improvement is completely successful.

No. III. extends to 23 acres 784 dec., and was, with the exception of two small portions, which are naturally dry, drained at a cost of £96, 2s. 6d. A portion, consisting of 8 acres 534 dec., has been put through a course of cropping, and laid down in grass without a white crop. The field, previous to its being drained, produced nothing but coarse grasses and rushes, with the exception of the dry portions referred to. The portion of the field in young grass was limed in the winter of 1859 with 782 bushels of lime, it being then 2 years in grass. About 8 acres of the remainder of the field were limed in the spring of 1861 with 748 bushels, and at a cost, for the whole lime, of £82, 17s. Since the operations of drainage and liming have been completed, the rushes and coarse grasses have nearly disappeared, and a much finer quality of grasses have taken their place. Of course the improvement will be more apparent when the lime has had time to act.

The average rent at which this field let, for 7 years previous to 1851, was £22, 18s. 2d. The rent realised for season 1860 was £50, and for season 1861 it is £70.

No. IV. is naturally dry, except a few acres, which were drained in the spring of 1857 at a cost of £21, 2s. 5d. In the spring of 1861 the field was top-dressed with 1112 bushels of lime, at a cost of £60, 4s. 8d. The extent of the field is 18 acres 776 dec. The average rent realised for 15 years prior to season 1859 was £56, 17s. 8d., and for seasons 1859, 1860, and 1861 respectively, £49, £66, and £74.

* Let for season 1862 at a rent of £232.

YOUNG GRASS FIELDS, NOS. V. AND VI.

No. V. contains 41 acres 531 dec., and drained. In 1856 it was in three divisions—20 acres green crop, 12 acres white crop, and the remainder pasture. The green-crop division was sown out in the summer of 1857 with rape and grass-seeds, eaten off with sheep. In the spring of 1858 the two grass divisions were top-dressed with 1840 bushels of lime, except a portion which was top-dressed with an equal money-value of half-inch bones, and about 1 acre used as a cricket-ground. The remaining portion of the field was sown out in spring of 1858, and limed in the following winter and spring with 733 bushels of lime.

In experimenting with the lime and half-inch bones, two spaces were selected across the field, of equal length and breadth. The one was dressed with half-inch bones at the rate of 22 bushels per acre, at a cost of 3s. 2d. per bushel, or £3, 9s. 8d. per imperial acre. On the other space was laid a row of lime at the rate of 64 bushels per acre, at a cost of 1s. 1d. per bushel, or £3, 9s. 4d. per acre. Hitherto no difference can be discerned between these portions; and as the field has been constantly depastured, besides being laid out in high condition, it is quite impossible to say that there is any difference in the produce. The average rent of the above field, previous to 1854, was £45, 3s. If let now (it having hitherto been in the proprietor's own hands), it would fetch at least £130.

This season experiments were made by top-dressing portions of the field with half-inch bones, dissolved bones, phospho-Peruvian guano, guano, and nitrate of soda, and salt. But the field being stocked during the summer, no comparison could be made, nor any satisfactory conclusion be arrived at, regarding the merits of the different substances used, therefore details are unnecessary. The only difference apparent between the portions top-dressed and what was undressed was, that the former had a deeper green colour, and that the stock seemed to graze closer on the portion so dressed.

No. VI. extends to about 27 acres 742 dec., and was sown out in two divisions. The first division was sown out with grass-seeds, along with a white crop in 1856, and the second, without a white crop, in 1857. The whole field was drained previous to being sown out. In January 1859 the field was top-dressed with lime, lime and earth compost, and half-inch bones, the lime and bones applied at the same money-value per acre—viz. lime at the rate of 70 bushels per acre, and at a cost of £3, 15s. 10d. per acre, and the bones at the rate of 24 bushels, and at a cost of £3, 6s. per acre. The same remarks apply to the experiments made in this field that do to No. V. The portion top-dressed with the lime and earth compost seemed to do better than either of the other portions; but not knowing the cost of the composts, I cannot give the cost per acre. I am of opinion that the latter is more expensive, and takes a

much longer time before it can be got ready for application, besides the double cartage and expense of mixing. In a word, where top-dressing with lime is made on a large scale, the compost system is impracticable; but in districts where lime is scarce and high in price, the portion to be top-dressed small, with plenty of road-ribbings and substances containing vegetable matter at hand, the compost system is worthy of consideration, particularly if the substances forming the compost along with the lime be applied to the soils to which best suited, such as siliceous and argillaceous composts applied to moss, and *vice versa*.

The rent obtained for field No. VI., for a period of nine years previous to the year 1853, averaged £28. In the year 1858, the rent realised was £70 for the season, £60 for season 1859, £58 for season 1860, and £55 for season 1861. This field I consider to be let under its value, compared to the rent realised for the other fields.

In the south of Scotland, the practice of top-dressing pasture-lands with lime has been successfully carried on for upwards of forty years, particularly on hill-pastures.

I was led to the practice of top-dressing pasture-land with lime partly from the still apparent beneficial results of top-dressing with lime made upwards of twenty years ago, partly from the nature of the soil, and partly from the great facilities and small cost at which lime can be procured. Within the last four years eighteen of the Springkell grass-fields have been top-dressed with 21,000 bushels of lime, at the rate of from 60 to 120 bushels per acre. The carting of the lime from the kilns, which are within one mile of the fields, was generally commenced about the beginning of December, and completed by the end of February. The lime was laid down in rows of heaps, containing about one bushel each, allowed to slake spontaneously, and to be in a pasty state before it was spread. Afterwards the fields—that is, the old grass-lands—were harrowed with heavy harrows with some brushwood attached; the young grasses were simply brush-harrowed. The objects gained by allowing the lime to be in a pasty state are twofold; first, it acts better in destroying the moss; secondly, and what is of equal, if not of greater importance, it keeps the lime longer on the surface of the ground than if applied in the quick state. Professor Johnston, in his 'Lectures on Agricultural Chemistry,' page 723, sec. 31, says:—

"Nor will you fail to see the important reasons why lime ought to be kept near the surface of the soil, since—1°, The action of lime upon organic matter is almost nothing in the absence of air and moisture. If the lime sink, therefore, beyond the constant reach of fresh air, its efficacy is in a great degree lost.

"2°. But the agency of the light and heat of the sun, though I have not hitherto specially insisted upon their action, are scarcely less necessary to the full experience of the benefits which lime is capable of conferring. The light of the sun accelerates nearly all the chemical decomposition that takes

place in the soil, while some it appears especially to promote. The warmth of the sun's rays may penetrate to some depth, but their light can only act upon the immediate surface of the soil. Hence the skilful agriculturist will endeavour, if possible, to keep some of his lime at least upon the very surface of his land. Perhaps the influence of light might even be adduced as an argument in favour of the frequent application of lime in small doses, as a means of keeping a portion of it always within reach of the sun's rays, and the more especially on grass-lands, to which no mechanical means can be applied for the purpose of bringing again to the surface the lime that has sunk."

Again he says, page 722, sec. 30, 1°.:—

"Lime combines with the acid substances already existing in the soil, and thus promotes that decomposition of vegetable matter which the presence of those acid substances retards. The further decompositions which ensue are attended at every step by the production either of gaseous compounds—such as carbonic acid and light carburetted hydrogen, which are more or less abundantly absorbed by the roots and leaves of plants, and thus help to feed them—or of acid and other compounds soluble in water, which, entering by the roots, bear into the circulation of the plant not only organic food, but that supply of lime also which healthy plants require. 2°, The change it induces upon substances in which nitrogen is present are still more obviously useful to vegetation. It eliminates ammonia from the compounds in which it exists already formed, and promotes its slow conversion into nitric acid, by which the nitrogen is rendered more fixed in the soil. It disposes the nitrogen of more or less inert organic matter to assume the forms of ammonia and nitric acid, in which states experience has long shown that this element is directly favourable to the growth of plants. And, 3°, It influences, in an unknown degree, the nitrogen of the atmosphere to become fixed in larger proportion in the soil, in the form of nitric acid and ammonia, than would otherwise be the case; and this it does both by the greater amount of decay or oxidation which it brings about in a given time, and by the kind of compounds which, under its influence, the organic matter is persuaded to form. The amount of nitrogenous food placed within reach of plants by this agency of lime will vary with the climate, with the nature of the soil, with its condition as to drainage, and with the more or less liberal and skilful manner in which it is farmed."

Professor Johnston's scientific views are largely corroborated by practical results. The only exception is, that lime applied in small doses to grass-land, and frequently, is not at all so satisfactory as a good heavy liming at first; indeed, the second application is, comparatively speaking, a failure. I have invariably observed that the fields and portions of fields heaviest limed are the most satisfactory.

In comparing portions limed last spring, of both old and young grass, with portions of the same fields unlimed, I was struck with the ease, from the appearance of the grass, with which the portions limed can be distinguished from the unlimed.

It may be objected that lime is only one of the many elements

required for the food of plants. True, but when we view it, not so much as an element of the food of plants as an agent of many chemical changes, we see at once that it is the means of bringing within the reach of plants many substances that are essentially the food of plants, besides neutralising deleterious substances in the soil. Again, on pasture-lands producing much grass, and pastured with stock, there will be much manure dropped throughout the season; and chemists hold that manures applied on the surface are benefited by the action of the atmosphere, and that the nitrogenous elements are increased and nitrates formed. In the island of Lewis—which is, by the way, a very wet country—I was much struck by results obtained from the application of manure on the surface of the ground, both to barley and potatoes. The application of manure on the surface, and especially on the barley or bigg crop, is all but the universal practice among the crofters in that island; and that at the time when the plant is just breaking the clod, the soluble salts of the manure are thus washed at once to the roots of the plant. Of course, the system is better adapted for a wet than a dry climate.

In conclusion, I have to state that, from my experience and observation, and from what I have learned from others who have had much experience, and the means of testing results for many years of lime as a top-dressing, I have come to the conclusion, that in districts where lime is to be had at anything like a reasonable price, it is the most permanent and the most profitable top-dressing at present known for pasture-lands; and that at no distant date draining and liming will change the aspect of many of the hills and valleys along the network of our railways, and add to our supplies of beef and mutton, as well as promote health by removing marshes and neutralising noxious vapours.

Next to lime as a top-dressing I would class ground bones; and, indeed, in many districts where cartage of lime would be an expensive element, bones would be the best substitute, applied at the rate of from 10 to 15 cwt. per acre. For coarse grass and rough hill-pastures lime is the best top-dressing, and should be applied at the rate of from 80 to 120 bushels per acre.

REPORT ON THE CULTIVATION OF WILLOWS.

By CHRISTOPHER Y. MECHIE, Duthill, Carrbridge.

[Premium—The Medium Gold Medal.]

PRELIMINARY REMARKS.

I OBTAINED my experience in the cultivation of willows in various districts of the country, and upon the properties of several noblemen and gentlemen, in some cases with a view of merely experimenting, and in others with the exclusive object of profit; in some instances upon small patches of ground a few yards square, and in others to the extent of several acres. And from my experience in every case, which is entirely *practical*, and the *result* of a *daily observation* for several years, I venture to affirm that the results of what I have experienced have fully convinced me that the cultivation of willow is the most profitable of all the various sorts of coppice-wood grown in this country.

The following report is drawn up principally from notes taken on the spot. But in connection with it I will abstain from using the names of my previous employers, or of their estates, having a delicacy in doing so without their permission. I shall, however, hold myself bound to give references upon any point required.

1*st*. The first point to be attended to, in connection with the profitable cultivation of willow, is *the choosing of a proper situation for the plantation or willow-bed.*

It is necessary to have it as far from a rabbit-warren as to be perfectly beyond the circuit of their ravages: this, however, varies according to local circumstances, such as abundance of their favourite food contiguous to the warren, large rivers or stone walls intervening. Under favourable circumstances I have found the willow-bed quite safe not quite half a mile distant from a numerous warren; and in other cases, the reverse of this, I have seen the plantation much injured by rabbits from a distance of about a mile.

I have never seen willow cultivated to advantage where stock is allowed to browse, or where there are many hares and rabbits, unless enclosed by means of wire-netting or palisade paling. Hares will travel to a distance of two miles in search of their favourite food: I have tracked them in snow to a willow-bed from over that distance.

The spider is also an enemy to the willow in sheltered situations, particularly to the finer sorts, which are of slow growth. It forms its nest in clusters among the tender top-leaves, consequently poisoning and deteriorating their growth. Hence the necessity of avoiding a shady situation, or one too much excluded from air.

The next consideration is to avoid gravel in the soil or subsoil, which, if found prevailing to within 2 feet of the surface, will be much against the crop.

Where a choice can be made, a flat piece of ground should be preferred to that of an incline, as in the former case the moisture is longer retained in the soil, and the labour of keeping down weeds, as afterwards detailed, is more easily accomplished.

The willow may be profitably and advantageously cultivated upon ground where no crop by any means remunerative can be induced to grow,—such as upon swampy lands which cannot be drained for want of proper declivity, or margins of river banks, where flooding renders cultivation for cereal crops precarious. Upon pond embankments or other precipices where the earth is disposed to slip, willow possesses several advantages over trees (proper) for firming embankments, as its roots spread over the surface, and penetrate to a depth equal to that of timber-trees, whilst the wind produces no important influence upon it in shaking and loosing the soil, or of being blown down with the wind.

2*d*. The next step to be taken, after fixing upon a proper locality and situation for the willow-bed, is to make choice of the soil most suitable to the sort of willow intended for cultivation; and though the most proper site is frequently upon a southern exposure, yet with reference to soil, as a general rule, I have found the most suitable inclining towards the north, and consequently had to balance between the advantages and disadvantages thus inseparably connected.

Any one accustomed to observe, can readily judge from the aspect of the herbage or plants indigenous to the soil. The general and most certain mode, however, of determining the quality of the land, is to dig pits over the ground to the depth of 3 feet.

I have planted willow upon various descriptions of soil, and in planting the different soils with twenty varieties of willow, I find all grow in clay or loam under various modifications, but none of them to thrive in pure peat-moss or in gravel. I conclude therefrom, as a rule, the more the soil inclines to clay or loam, and the less to peat or gravel, so is it to be preferred for the growth of willow.

With reference to subsoil, in cutting the willow from the stools after three years planted, and upon weighing the produce of fifty stools of each of three varieties grown upon gravel, sand, and clay, I found the greatest weight upon the clay, and least upon the gravel. In support of the above experiment, observation has since repeatedly confirmed to me that a deep friable loam, incumbent upon a clay subsoil, free from stagnant water, is the soil best adapted to grow willow; whilst *a stiff clay*, with stagnant water in the subsoil, or where sharp sand forms the soil, and above all gravel, are each to be avoided in selecting the soil most suitable for willow culture.

Loam may be said *truly* to produce the greatest weight per acre, whilst clay soil produces the finest sample in point of colour and quality. Ground naturally poor should not be put under willow in contemplation of enriching it with manure, as willow grown upon manured land is apt to blister, and excrescences form upon it in a manner similar to the larch upon unfavourable soil. Moss in a pulverised state, with a mixture of sand, will grow such willow as the Viminalis or Caprea, but the quality of the willow is only third-class.

3*d*. Having selected the site and made choice of the soil, the next step in advance is to prepare the ground for planting. If the herbage is rough, as is generally the case with land well adapted to grow willow, I first cut or pare off all such roughness, and proceed with trenching the ground to a depth of not less than 24 inches, thoroughly breaking and pulverising the earth as the work is proceeded with. The soil should not be turned over in large lumps, or rough sods turned loosely over, and laid hollow, *than which practice* nothing can be more unfavourable to the growth of newly-planted willows.

Having the ground all trenched as above stated, my plan is to go all over the ground twice in succession with an implement termed in the south a Canterbury hoe—that is, a three-pronged tool resembling the common manure-hawk, and used in a manner similar to the practice of mixing plasterer's mortar, proceeding with the work as if hoeing with the common hoe.

If the work of trenching is performed late in spring, the ground must be well rolled with a heavy roller; or what I have found of greater advantage for solidifying the soil is to stir about a flock of sheep upon it for a short time; or, if time will permit, sow the ground with rape, and fold sheep over it several times. If the latter system is adopted, the ground will require to be afterwards ploughed and harrowed, and is then fit for planting either with cuttings or rooted plants.

Tile or other close drains are to be objected to in preparing the ground for a willow plantation, as the roots in a very short time find their way into the bottom of the drains, unless they are fully 4 feet deep, which soon choke them up, and render them worse than useless. If the ground requires draining, open drains only should generally be employed, and those in no instance less than 36 inches deep. As a rule, I have found drains in an osier bed answer best 36 inches deep, 36 inches wide at top, and 12 inches broad at bottom. I have got such drains made, and the soil properly spread and levelled along the sides of the drains, for 1½d. per yard. The distance apart at which the drains are laid on must be regulated according to circumstances, but in every instance reducing *the water-table* to a level of at least 30 inches below the surface. Hence, if the drains are 36 inches deep, they will require

to be laid on at a distance not greater than 30 feet apart. There is comparatively little loss of ground occasioned by open drains in a willow plantation, as the willow is planted so as to allow each drain to form an alley between two rows.

In preparing bog or marsh for growing willow where a declivity for drainage cannot be obtained, I have found the following system answer admirably. Lay up the ground in ridges, allowing the water to remain in the intervening trenches; the ground to be raised to from 30 to 36 inches above the surface of the standing water. The deeper the trenches are made the better, as they can be formed wider apart; hence a saving of ground is effected. Though the water may occasionally rise to a height above that specified, yet no injurious results may take place in respect to the plantation, such floodings being generally at considerable intervals, and of short continuance. Observation, however, satisfies me of the necessity of preserving the roots from stagnant water, in order to preserve the stools in proper health and vigour for any great number of years. I have always observed that willow plants in stagnant water, whether the water is in the soil or the *water table* up in the subsoil, soon show symptoms of decay; the stools begin to die out, and the general crop becomes annually lighter than upon ground sufficiently dry.

4th. Procuring rooted Plants or Cuttings.—Having adopted both systems in cropping a willow-bed, I shall state the advantages arising from each. On the one hand, in employing rooted plants, a much quicker return is made to the grower, the growth of the tap-root is, in consequence of transplanting, checked, and a number of rootlets are induced to strike out on all sides, which is highly conducive to the ultimate success of the plantation; particularly so in cases where the subsoil is improperly drained. On the other hand, by employing cuttings the ground is put under crop at a much cheaper rate than by using rooted plants; the labour of planting is sooner accomplished; and the tap-root may afterwards be cut by means of a sharp spade, without injury to the plant in other respects.

Cuttings are procured from the strongest and most healthy rods of one year's growth, cut from the stools in February, and taken from the bottom part of the rods to about two-thirds of their entire length. The cuttings are made 9 inches long, and the operation performed by cutting the end of the rod that enters the ground through in a horizontal manner, whilst the top of the cutting is made in a slanting direction, in order to the water running readily off without affecting the cut part injuriously. Great care is necessary to be exercised with regard to the cuttings, in order to preserve them from losing their sap, as a few days will, in drouthy weather, render them quite dry and worthless. They should, therefore, either be planted immediately after being taken from the stool, and made or covered over with straw or loose earth, where, with an occa-

sional watering, they may remain for a short time 'till convenient to plant them out.

If the cuttings are bought from a nurseryman, this should be done in February, as a few days' exposure to a March wind soon destroys their vitality; hence failure and disappointment. In purchasing cuttings they should be supplied according to sample, as cuttings made from near the top of the rod should not be planted. Of course, a higher price must be paid for select cuttings, but this is as it ought to be; the purchaser ultimately gains more by it than the exposer, as the marked difference for several successive crops is so apparent to even the least initiated, that no one would plant inferior cuttings on the score of costing a few shillings less.

5th. *Planting and Management of the Willow-Bed.*—February and March are the two months of the year best adapted to plant willow; the former, if weather will permit, is to be preferred. The following is the system I adopt and recommend: Stretch a garden-line from side to side of any convenient length of line, keeping the rows of the whole piece in a line straight with and parallel to each other. This mode I have frequently found of no small advantage in shooting rabbits or other vermin which seek such places of resort.

The rows are 24 inches apart, and plants in the row 16 inches separate, except some of the more spreading sorts, which may be 18 inches separate in the row. After the line is properly extended and in its right position, having been previously marked off with pieces of scarlet worsted 16 inches apart, and being provided with a small iron rod (similar to the arrow used in land-measuring) for a dibble, proceed along the line, inserting the dibble into the ground opposite the red marks upon the line, then withdrawing the dibble, at the same time inserting the cutting to two-thirds of its entire length, and then applying both feet to the sides of the cutting, firmly trampling the earth closely and neatly all round the plant.

The willow plantation requires little attention during the first season subsequent to planting till the succeeding February, at which time the crop is ready for clearing off the ground. This being done, and previous to the tender shoots of the second year being produced upon the stool, the ground requires cleaning, in order to keeping down all rank grasses and weeds. The system which I have followed for several years with the most satisfactory results I shall here describe. From the latter end of March to the latter end of April, embracing the opportunity when the ground is tolerably dry, I have the ground all neatly pointed over with the spade, carefully avoiding injuring the roots near the surface, covering all grasses and decayed leaves, &c. This work can be done for 20s. per acre, and the plantation requires no more labour till again ready for cutting next February. If the operation of hoeing is performed

during the summer season, many of the young shoots are thereby injured or broken off from the stools. The work requires to be repeated at least three times in the season, which, at 10s. each time, makes the expense of hoeing one-third more than that of pointing over the ground; I would, therefore, discommend the practice of hoeing, and recommend the practice of pointing.

If the willow-bed is upon the margin of a stream or river subject to the washings of floods, the surface may be kept clothed with permanent grass, and hand-cut it several times during the summer season, cutting the willow from the stools in November, and using it in the rind. The willow suitable for the above situation may be one of the sorts recommended for general soils and used for coarse wares. I have advised cutting in November in this instance, as ice-floods quite destroy the rods. I have seen willows rendered nearly useless from such accidents.

A few cuttings should be put in, at time of planting the willow-bed, in a reserve corner, in order to root, for the purpose of filling up where an occasional plant will die out.

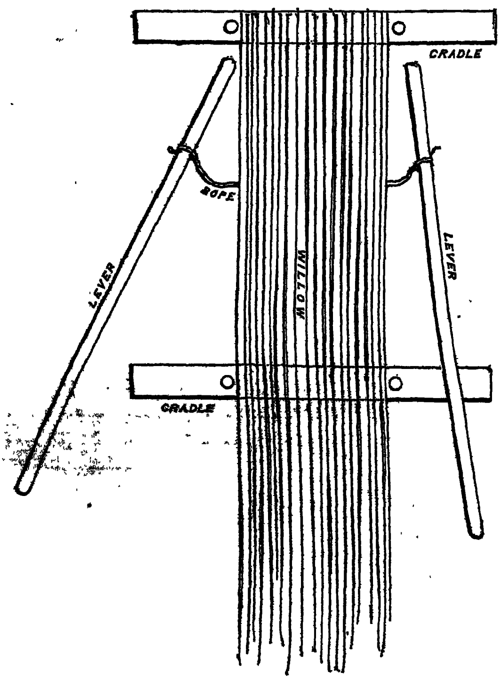
6th. *Cutting Willow and Preparing for Peeling.*—In the beginning or towards the middle of February the willow is cut from the stool, whether of one or more years' growth. This operation is performed by cutting with a *sharp* knife. The first time the willow is cut subsequent to planting, it should be done so as to leave three eyes upon the young wood, or what is termed the "spur." Care should, however, be taken in all future cuttings to keep the top or crown of the stool low, allowing the sides to swell out: by preserving the stools in this form, the rods are more regularly distributed over the whole surface. Hence the crop is not only more prolific, but the rods are more handsomely grown, and of better quality, than if closely crowded together upon the top of a narrow-headed stool. The habit of growth of the variety, however, has much to do in guiding us in this particular, as there are some sorts—such as the *Espatcheon*—of a spreading disposition; the heads of its stools should be kept close, allowing the rods to start in a mass from the stool, to prevent straggling or spreading out. In planting also I keep this variety 18 inches instead of 16 inches apart in the row. In cutting, I would again repeat the necessity of having the knife sharp, and cut so that, when looking down upon the top of the stool, the cut of the knife is not observed, being in reality on the under-side of the rod, or rather the spur. In order to produce a clean and proper cut, a *keen edge* upon the knife is indispensable, and which, if not preserved, will bruise and strip the bark from the spurs remaining upon the stools, which is both hurtful to the plant and offensive to the eye, leaving, at the same time, the bottom of the rods in a ragged and unworkmanlike condition, subject alike to remark and detraction by the purchaser.

From the circumstance of the sand being washed up upon the

stools, the knife soon loses its edge, which requires frequent whetting to keep it in proper cutting order. I have seen much valuable time lost from want of taking into account and providing against the above circumstance. The work of cutting is proceeded by each man taking before him one row, cutting and laying down the willow in handfuls; these are carried off by another person to a convenient spot near at hand, in order to be tied up or bolted, which latter operation is performed in the following manner:—

Lay flat upon the ground two pieces of wood, each about 3 feet long and 4 inches square; lay these parallel to each other 3 feet apart, and through each of them bore two holes with 1½-inch auger at 18 inches apart, through which holes drive 24-inch pegs, allowing them to go 12 in. through into the ground, forming what is called a cradle.

Willow lying in the cradle to be tied up.

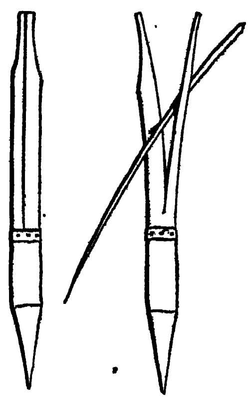


There is next a piece of strong rope attached to two handles 4 ft. long, and about the thickness of a strong spade handle. The handles, with the rope attached 16 in. from one end, are laid down, one on each side of the cradle, the rope extending between and underneath the willow, which is laid between the four pins in the cradle. When the pegs are filled with willow to the top, the handles are reversed to opposite sides, bringing the rope over top of the willow, to be bound up, or bolted, as it is termed. The levers are now pressed down and kept in their place till a withe is twisted tightly round close to the rope held by the levers. The levers are then let go, and the bolt is finished and ready to be carted to a pool or pond, where it is set on end, immersed in water to a depth of from 9 to 12 inches, and is there allowed to remain till the catkins are fully out, and the leaf-bud beginning to burst, when it may be considered ready for peeling or rinding.

The willow, when taken from the stool, is tied up in bundles 30 inches round, it being more convenient to have them in small than in large bundles, as they are frequently to handle and move from place to place.

In bolting the willow where a considerable variety is cultivated, tallies must be provided and attached to the bundles before carrying it from the place of bolting.

7th. Preparing of Willow for Market.—Being now in bundles, and in the water for the purpose of starting the sap, a watch must be constantly kept that none of it fall down or is left out of the water. I generally fix a few flakes or wattles in the water as a support against its falling down. Its progress towards fitness for peeling must be observed, which, when sufficiently advanced, must be proceeded with as follows:—Set to work a sufficient number of women or lads in the following manner.



Clamp or Rinder shut.

A clamp or rinder is provided, which is simply a piece of tough wood, similar in thickness to a fork or rake handle, 3 ft. long, and sawn down the centre to 12 in. from bottom, which is shod with iron similar to a dibble, for the purpose of going into the ground, when it is placed between the knees of the operator, he being seated upon a low stool. Down the centre of each half of the split part of the rinder is inserted a piece of No. 4 fencing-wire, sunk to half its thickness into grooves in the wood, the two edges of the wire coming exactly opposite each other in the centre: the top of the rinder is reduced sufficiently small to enable the operator to grasp it readily, which he does with the left hand: the rod is taken in the right hand, thick end first, and placed between the jaws of the clamp, the left hand at the same time pressing the jaws together; the rod is then drawn sharply through, which cuts the bark on opposite sides of the rod; the rod is then reversed in the hand; small end first is placed in and drawn through the clamp in a similar manner. The rind now hangs quite loose, and separates from it with the greatest of ease.

The willow, as it is peeled, is laid out upon a clean bank, or set up loosely against a wall or other support, on purpose for drying, which is accomplished in a few days of favourable weather. Particular care is necessary in preserving it from rain during the process of drying, as the least wet discolours the wood, rendering it less valuable in the market.

Having the willow sufficiently and properly dried and kept clean, it is then sorted and sized into three different lengths, making the bolts in each 42 inches round, 12 inches from the

base. The operation of tying the bundles is again performed as previously explained and illustrated. The withes employed in bolting must be white and newly peeled, being thus more elastic than old dried rods. I cannot recommend too strongly the necessity of performing this part of the work in a thorough and efficient manner: after the first withe is bound round at 12 inches from the base, another is attached to it, passed over the base of the bolt, brought up and fastened to it on the opposite side: another, and even a third, may be applied in a similar manner.

Two withes are bound round lengthways upon the longest size of the bundles, and one only in binding the short ones.

When the work of bolting is accomplished, the willow may be stored by in a dry clean airy loft till a satisfactory market is obtained for it, observing to attach to each bolt a label with the grower's name and address, as also the name of the willow upon it.

8th. Purposes for which the Willow are employed.—The principal purposes to which the willows of annual growth are applied, is the manufacture of baskets of endless form and variety, from the fancy work-basket in the parlour to the plain clothes-basket in the laundry; from the elegant ornamental reticule to the housewife's common market-vessel; from the smallest cage for the canary to the elaborate aviary.

Chairs of vast variety and descriptions are manufactured from willow. Tables for vases, flower-baskets, and furniture for grottoes, are made from willow in endless variety. Carriages, also perambulators and cradles for children, constitute the principal wares manufactured from willow of one year's growth, in the peeled or white state.

Willows in the rind or green state are employed chiefly in the manufacture of jar-covers, meat-hampers, panniers, and baskets for culinary purposes.

Willow cut over, at periods of from four to eight years' growth, is employed principally in the manufacture of toys, hoops for barrels, and handles for rakes and scythes, &c.

9th. Marketing of the Willow.—Willow is generally sold either in the white or in the green state, after being cut from the stool, but in some cases also upon the stool. I shall state the advantages arising from each system. When we take into account the increasing use of willow in this country, and in connection with this the extensive imports from foreign parts, we see not only the prospect of an open and ready market, as we have generally found hitherto, but the greatest encouragement for extending and increasing our home growth.

Having sold willow upon the stool as well as after being cut, I may state an advantage arising out of this system as well as the other two modes. In the first place, the grower is saved all labour and trouble in preparing the willow for the market; and as the

process of peeling, &c. is attended with no small labour and risk, the grower is saved from both, and besides has his returns four or five months earlier than he could have by peeling it.

The advantages arising from cutting and selling it in the green state are, that the quantity per acre is more readily ascertained, and being cut by the proprietor, due attention is given in preserving the stools in a proper form, &c.

The principal objections, however, to selling the willow either upon the stool or cut in the green state, and sold by measurement or weight, is, that the principal and only purchaser is frequently a local basket-manufacturer, who, for want of competition, gets the willow at his own offer.

The system of marketing, however, which I have ultimately adopted, after considerable experience in each mode, is to market the willow in the white or peeled state, as in this condition a satisfactory market can be waited for without the ware sustaining any injury, provided it is kept in a clean dry airy place. I have found that, after paying railway carriage for a distance of over 50 miles, a very considerable balance remains over in favour of taking it to market, compared with that of selling it in the rind to a local basket-manufacturer.

The affixed prices apply only to peeled and dried willow in the market.	2/6 per st. is an average price for	1 year's growth of good		willow.
	1/9 per do.	do.	do. coarser sorts of	do.
	1/ per do.	do.	4 years' growth	do.

10*th. Expense of preparing the Ground and putting under Crop of Willow* 1 *imperial Acre*:—

Trenching the ground 24 inches deep, as performed under head 3d.,	£9	0	0
16,000 cuttings at 20s. per 1000, ...	16	0	0
Hoeing 2 times with Canterbury hoe, at 7s. 6d. per acre, .	0	15	0
Rolling with metal roller, 2 horses 5 hours, at 1s. per hour, .	0	5	0
Planting cuttings, ...	1	0	0
Carriage of cuttings, ...	0	10	0
	£27	10	0

11*th. Produce of an imperial Acre of Willow, and clear Balance of three successive Crops, exclusive of original outlay or interest*:—

First year's crop, peeled and dried for market,	64 st. at 2/6,	£8	0	0				
Cutting, peeling, and keeping clean for one year, .		1	18	0				
						£6	2	0
Second year's crop, . . .	80 st. at 2/6,	£10	0	0				
Cutting, peeling, and keeping clean, . . .		2	3	4				
						7	16	8
Third year's growth, . . .	93 st. at 2/6,	£11	12	6				
Cutting, peeling, and keeping clean, . . .		2	7	8				
						9	4	10
Clear product of 1 acre for 3 years,						£23	3	6

The above acre was of various qualities of soil, about two-thirds of a gravelly nature, part stiff clay; altogether the soil might be consi-

dered rather unfavourable for growing willow. Upon a few small patches of rich deep calcareous loam a yield of twice the above average was produced.

12*th. Sorts of Willow adapted to general Soils, and Purposes to which they are best suited to be cut over annually, peeled and prepared for Market.*—The following four sorts I give in the *successive relative value* in which they are generally held in esteem for fine basket-manufactory.

1st. Forbyana—Forby's willow.
2d. Viminales—Twiggy-leaved.
3d. Vetellina—Golden drop.
4th. Cinata—Woolly-leaved willow.

The next four sorts, suitable also for general soils, to be cut over annually, peeled and prepared for market. I give them in the successive relative value in which they are esteemed for strong basket-work.

1st. Rubra—Red-leaved willow.
2d. Caprea—Yellow swallow willow (palm).
3d. Pentandria—Swallow-tail.
4th. Undulata—Sharp-leaved willow.

The four sorts I next give are suitable for general soils, to be cut over at periods of from four to eight years, to be sold in the rind; and are suitable for hoops, handles, toy-wood, &c.

1st. Russelliani—Bedford willow.
2d. Alba—Huntingdon willow.
3d. Fragilis—Red-wood willow.
4th. Stipularis—Aureold-leaved willow.

ON THE DISEASE OF THE LARCH.

By John Morrison, Coney Park, Nursery, Stirling.

[Premium — The Silver Medal.]

The failure of the Larch in this country cannot but be viewed as a very serious matter, and deserves the attention of all who are in any way interested in growing the tree or using the timber. Larch has become almost indispensable for certain purposes, and we have no proper substitute for it. Its rapidity of growth, and the durability of its timber, give it considerable commercial importance, and any curtailment of the necessary supply would not only

be generally felt to be a great inconvenience, but, in a money point of view, a heavy loss. It was supposed by some that the deodar *(Cedrus Deodara)* would in a few years become the rival of larch—the deodar being also of quick growth, and its wood of excellent quality; but the effects of 1860-1 winter's severe frost upon this plant will be an obstacle to its introduction into the market for many years to come. In these circumstances, I consider it to be the duty of every person having a practical knowledge of the habits of the larch, or who has watched the progress of the disease from its first appearance in the young plants, to state his views for the information of those more immediately concerned in the cultivation of the tree. And I beg respectfully to submit the following statement as the result of actual experience and observation, not being aware that any one has taken the same view of the case while treating of this subject.

In reference to the soil most suitable for the growth of the larch, there is considerable difference of opinion. Although a good medium loam with a dry bottom is that best fitted to bring the timber to perfection, yet for the first twenty or thirty years the trees appear to thrive equally well on strong loam or poor gravelly land. After attaining that age, the result appears to tell more in favour of the loam; and I believe the finest specimens of the larch in the north of Scotland are to be found growing on the edge of a moss or bog. Nevertheless, in almost every variety of soil we hear of the disease lurking.

If we examine the effect of situation in connection with soil, although it is found that in some localities a southern or western exposure is most agreeable, in other places the trees do well in an eastern or northern situation, so that there seems good reason for believing that soil and situation have comparatively little, if indeed anything, to do with the prevalent failure of the larch.

To what, then, is the disease attributable? In tracing the history of the larch from its introduction into this country in the beginning of last century, we may safely conclude that as much care and attention would be bestowed on its cultivation as is now given to that of our more recent and expensive introductions of the Coniferæ, and under such management no symptoms of decay appear to have manifested themselves. But when the quality of the timber became known and appreciated, immediately greater breadths of land were planted, and in very many cases, I am afraid, without suitable preparation or care, either as regards proper selection of seed, draining, or thinning; and to this heedless system of cultivation there can be no doubt the commencement of the disease belongs.

The larch thrives on the mountains of the Tyrol, &c., at an elevation of from 3000 to 6000 feet above the level of the sea, and therefore it may well be considered sufficiently hardy and suitable

for our climate. Although growing in such a high region, the trees mature their seeds much better than in this country; and admitting that all our seeds from the Continent are not got from such elevations, yet throughout they have a warmer and longer summer, while the variable character of our summer and autumn weather does not permit their perfect development. Imported seed is more firm and plump, and generally grows two to one as compared with home-saved. We cannot expect a strong, healthy plant from a half-filled, half-ripened seed. Although such may germinate, it can only produce a sickly tree, and this in turn brings forth its kind. We know well that a larch in an unhealthy state produces double the quantity of cones that a vigorous tree does, and therefore it becomes a most important question, Do the seed-collectors reject this unsound seed, or do they gather indiscriminately? Being in conversation a short time ago with a well-known Scotch fir and larch seed-collector in the north of Scotland, I inquired whether it was the general practice for dealers to gather seed from trees which were evidently in an unhealthy condition. He stated that such might be the case on the part of some seed-collectors, but his own invariable rule was to take seed only from mature and vigorous plantations; and he had no doubt whatever that what was gathered from weakly trees produced none but feeble and diseased plants. This statement confirms my own previous conviction, and coming from a gentleman of extensive experience, shows that the disease is largely propagated by inferior seed; and until a system of selection obtains, and collectors superintend personally the gathering of their seed, in place of buying the cones at so much per bushel or peck, we can never hope to eradicate the evil and regenerate the stock.

I have no hesitation in saying that but for a few of our nurserymen, who have been in the habit of importing a quantity of foreign seed annually, and by such means infusing, as it were, fresh blood into the source of supply, this troublesome disease might have been much more general and serious than it is. We frequently hear of some plantations growing strong and vigorously, while others, in precisely the same circumstances, prove complete failures. The cause is to be found in the seed being good in the one case and bad in the other. I have always found that where the genuine Tyrolese seed, or that from high localities, is grown, the plants surpass in healthiness and rapidity of growth those raised from home-saved seed; and while it has been objected that such plants are less hardy than those raised from our own seed, I can state that, for a long time past, I have carefully watched the progress of both, side by side, from the one-year seedling to the two-year transplanted, and after the first year could never perceive any difference between them. In some seasons I found the one-year foreign seedling prolonged its growth in autumn, and was apt to be caught by early

frost; but, after being transplanted, I have never observed any dissimilarity in regard to early or late growth.

In addition to what I have thus indicated for the prevention of the disease and the improvement of the stock, I would further suggest that a somewhat different management is requisite on the part of nurserymen. In place of having beds 3½ feet broad, and from 20 to 25 yards long, producing 40,000 to 50,000 one and two years' seedlings, were the same space of ground to contain about half the above quantity, it would conduce greatly to the healthiness of the trees. The best soil is productive only to a certain extent, and beyond that limit nature will not by any means be forced. No tree is more sensitive of confined space and impatient of want of air than the larch; and while in some cases a shortsighted and mistaken policy may still compel adherence to the present practice of crowding, I am thoroughly convinced that true economy consists in growing the plants much thinner than has been generally done. Even with an additional cost of about a third more per 1000, superior plants would ultimately be found much cheaper than those now to be obtained in the market, and there can be no doubt they would come to be preferred.

A thorough system of draining for forest-planting is also needful, for the larch does not thrive in wet, sour land. Every piece of ground allotted for this purpose should be carefully examined, in order to ascertain what extent of draining may be really required; and although the roots of the trees seldom go far into the subsoil, it is generally advisable to drain to that depth; and after the drains are made, should the land be very wet, it would be much better to wait for a season until it drip sufficiently. Experience has proved that, without attention to draining, any previous care bestowed in the selection of proper seed, or in the preparation of the land, is utterly lost; and proprietors would consult their own interest by cordially seconding the exertions of their foresters in this important matter.

Besides the suitable preparation of the soil, there is yet a most essential part of forest culture to be attended to—viz., the early and careful thinning of the young plantations. Whether it be the case that the blistering which frequently manifests itself on naked and drawn trees in plantations is the result of raising from thickly-sown seed, I am not prepared confidently to assert; but it is possible that such may be the fact, and that the germ of the disease may remain latent in the plants till they arrive at a certain age. The existence or development of this excrescence greatly depends on the future circumstances of the young trees; and nothing encourages this unhealthy token so much as having them growing close together. In such a condition, having no room to expand, they become lank and bare, and on being thinned are all the more liable to be caught by the spring or autumn frosts at the ascending

and descending of the sap. Suffered to grow deprived of the needful circulation of air, they acquire a sickly habit, and when suddenly exposed, the change is too much for them; they are, as it were, frost-bitten, and the blistering is the manifestation of the evil. But careful and timely attention to the requirements of the young trees would prevent this. Were a sufficient space for their healthy development always maintained, and the clearing away of all superabundant growths attended to, it would allow the plantations to get a fair start; and I have no doubt the young trees would soon acquire a vigour such as would enable them to overcome any tendency to blistering which they might otherwise exhibit. We seldom see a larch covered with branches to the ground presenting a blistered appearance; and were the treatment here suggested generally followed out, there would be comparatively few cases of failure heard of.

The object of the above remarks is simply to point out what I deem the chief causes of the failure of the larch, and to suggest the proper remedies. My attention has been directed to the subject for some time past; and having satisfactorily proved the efficacy of the plan now recommended, I submit it, with all deference, for the consideration of others. Should they think the observations now made sufficiently important to induce them to make trial of the same mode of management, I am confident they will find it highly successful, and be led to adopt it in all time coming; while by their co-operation they will be assisting in counteracting an evil which has already caused the loss of much time, labour, and money, and is certain to cost a great deal more if not speedily arrested.

PROCEEDINGS IN THE LABORATORY.

By Thomas Anderson, M.D., Professor of Chemistry in the University of Glasgow, and Chemist to the Society.

ON THE COMPOSITON OF THE WHEAT CROP AT DIFFERENT PERIODS OF ITS GROWTH.

(*Continued from page* 396.)

The point which most immediately attracts attention in this stage, is that, notwithstanding a month's additional growth, the weight of the produce, in place of increasing, has slightly diminished. A very cursory inspection, however, is sufficient to show that this apparently anomalous result is due to the diminished proportion of water contained in all parts of the crop. In point of fact, when the *dry matter* in the plant at both stages is considered, the increase is found to be decided, though not so great as in the previous stage.

Dry Matters in the entire Plants in an Acre, exclusive of Roots.

Third stage, ...	6,696 lb.
Fourth stage, ...	8,785 „
Increase, ...	2,089 lb.

Here, accordingly, there has been an increase to the extent of about 30 per cent of the weight at the previous period; but this is trifling when compared with the advance the crop made between the second and third stages, when the quantity of dry matter rose to nearly five times its previous weight. The distribution of the different constituents through the plant, offers many peculiarities of interest and importance. The analyses more particularly tend to show that, during the whole of this stage, scarcely any nitrogen has been absorbed, the quantity found at the two periods differing by little more than 1.5 lb. But the distribution of that assimilated during the previous stages has been totally altered; for whereas in the third stage only about one-seventh of the whole albuminous compounds was found in the ear, they now contain one half of them. In fact the leaves more particularly, but also the straw to some extent, have been deprived of much of the nitrogenous matters previously existing in them in order to produce the seed, the great reservoir of these substances, and in which they are accumulated in order to serve the requirements of the young plant which is destined to spring from it. At this stage it may be said that the period of active growth had passed; the straws and leaves no longer required the large quantity of nitrogenous matters which appear to be

closely connected with the process of vegetation, and they are therefore stored up for future use. Similar observations may be made regarding the mineral matters. Potash, which exists abundantly in every part of a plant where vegetation is active, has undergone no increase, but it has accumulated to a greater extent in the ears, and diminished in all the other organs. Among the inorganic elements, the most remarkable increase is in the phosphoric acid, of which the proportion contained in the ears exceeds that in the entire plants at the previous period. The increase in silicic acid is obvious, though by no means so striking; but that of the other elements is scarcely changed.

Fifth Stage, 25th September 1860.

It was not till this unusually late period, not less than a month after the usual time of harvest in the district, that the crop was ready for the sickle. This was due in part to rains which prevented harvest operations being carried on till some time after the crop was ripe; and it might possibly have been advisable for me to have taken the material for the final examination at the exact time when it reached full maturity. To have done so would, however, have introduced some degree of uncertainty. It would not be easy to pronounce upon the precise period at which this takes place; and as agriculturally we must look to the time at which the crop is harvested, I thought it better to delay the last series of analyses till the day on which the crop was reaped, when the produce of 5 square yards was again submitted to experiment:—

Ears of 50 average plants,	6450 grs.
Straws, upper portion,	3660 „
„ lower portion,	7060 „
Leaves,	900 „
Roots,	1250 „
	19,320 „
Average weight of each plant,	386.4 „

It will be noticed here that the average weight of each plant has largely increased; but it is quite obvious that some error has been committed, as the produce per acre, owing to its having become much drier, had diminished. Unfortunately this discrepancy was not detected till some time afterwards, when it was too late to trace it back to its cause. It is not, however, of material consequence, as from particular circumstances I know that the relative proportions of the different parts of the plants are correctly given, and that is the point which is of importance for the calculations.

The total produce of 5 square yards was 120,987 grains, equal to 7 tons 5 cwt. 2 qrs. 5 lb. per acre, divided as follows:—

Ears,	5443 lb.
Straws, upper portion,	3088 „
„ lower portion,	5957 „
Leaves,	759 „
Roots,	1055 „
	16,302 „

In order to maintain uniformity with the previous stage, the entire ears were analysed fresh, and the results were—

Water,	39.73
Albuminous compounds,	6.68
Other organic matters,	50.23
Ash,	3.35
	100.00
Nitrogen,	1.07

After being kept for some time until they had become dry, and were in the state in which they would have been if they had lain for some time in the stack, the grains and chaff were separately analysed and gave—

	Grain.	Chaff.
Water,	15.16	10.56
Albuminous compounds,	12.47	2.03
Starch, &c.,	66.00	41.27
Fibre,	4.25	27.22
Ash,	2.12	18.92
	100.00	100.00
Nitrogen	2.12	0.32

Analysis of the ash :—

	Grain.	Chaff.
Peroxide of iron,	0.75	0.84
Lime,	1.50	2.48
Magnesia,	6.37	1.07
Potash,	21.35	4.67
Soda,	1.53	0.46
Chloride of sodium,	0.72	1.18
Phosphoric acid,	33.24	3.96
Sulphuric acid,	0.91	0.99
Silicic acid,	3.78	81.08
Charcoal,	30.15	3.35
	100.30	100.08

After deduction of charcoal, these give—

	Grain.	Chaff.
Peroxide of iron,	1.07	0.87
Lime,	2.14	2.56
Magnesia,	9.98	1.10
Potash,	30.55	4.81
Soda,	2.18	0.48
Chloride of sodium,	1.02	1.22
Phosphoric acid,	47.38	4.09
Sulphuric acid,	1.20	1.02
Silicic acid,	5.38	83.85
	100.00	100.00

In the *dry* ears the proportion of grain and of chaff was as follows:—

		Containing Ash.
Grain,	78.57	1.96
Chaff,	21.43	4.53
	100.00	6.49

From which data the ash of the entire ears is calculated—

Peroxide of iron,	0.93
Lime,	2.44
Magnesia,	3.51
Potash,	12.57
Soda,	0.99
Chloride of sodium.	1.16
Phosphoric acid,	17.16
Sulphuric acid,	1.08
Silicic acid,	60.16
	100.00

Analysis of the Straws.

	Upper portion.	Lower portion.
Water,	44.04	50.11
Albuminous compounds,	1.50	0.88
Other organic matters,	48.55	46.51
Ash,	5.91	2.50
	100.00	100.00
Nitrogen,	0.24	0.14

The ash contained—

	Upper.	Lower.
Peroxide of iron,	0.12	0.21
Alumina,	...	0.84
Lime,	2.71	1.98
Magnesia,	3.45	3.37
Potash,	12.88	12.68
Soda,	0.59	0.74
Chloride of sodium,	2.70	2.58
Phosphoric acid,	1.56	1.22
Sulphuric acid,	2.43	2.23
Silicic acid,	71.06	65.51
Charcoal,	3.52	9.96
	101.02	101.32

Deducting any charcoal, and recalculating to 100 parts, these give—

	Upper.	Lower.
Peroxide of iron,	0.12	0.23
Alumina,	...	0.92
Lime,	2.78	2.17
Magnesia,	3.54	3.69
Potash,	13.21	13.88
Soda,	0.60	0.81
Chloride of sodium,	2.77	2.82
Phosphoric acid,	1.60	1.33
Sulphuric acid,	2.50	2.44
Silicic acid,	72.88	71.71
	100.00	100.00

Analysis of the Leaves.

Water,	12.83
Albuminous compounds,	2.68
Other organic matters,	67.74
Ash,	16.75
	100.00
Nitrogen,	0.43

The ash contains—

Peroxide of iron,	2.51
Lime,	3.43
Magnesia,	1.94
Potash,	6.25
Chloride of sodium,	2.11
Phosphoric acid,	3.26
Sulphuric acid,	1.03
Silicic acid,	71.88
Charcoal,	7.71
	100.12

Recalculated after reduction of charcoal, we have—

Peroxide of iron,	2.71
Lime,	3.71
Magnesia,	2.09
Potash,	6.74
Chloride of sodium,	2.27
Phosphoric acid,	3.52
Sulphuric acid,	1.11
Silicic acid,	77.85
	100.00

In calculating from the preceding analysis the quantities of the different substances contained in the crop produced on the acre, it is necessary, as in the former cases, to deduct the weight of the roots, when we have the following—

Entire produce of acre, ...	16,302 lb.
Deduct roots, ...	1,055 „
Produce analysed, ...	15,247 „

The following table gives in pounds the quantities of the different elements this produce contained—

	Ears.	Straw. Upper part.	Straw. Lower part.	Leaves.	Total.
Water, . . .	2163.05	1359.95	2985.06	97.37	6605.43
Albuminous compounds,	363.59	46.32	52.42	20.34	482.67
Other organic matters,	2734.02	1499.22	2770.60	514.16	7518.00
Ash, . . .	182.34	182.51	148.92	127.13	640.90
	5443.00	3088.00	5957.00	759.00	15247.00
Nitrogen, . .	58.24	7.41	8.34	3.26	76.25

Mineral matters per acre in pounds—

	Ears.	Straw. Upper.	Straw. Lower.	Leaves.	Total.
Peroxide of iron, .	1.70	0.22	0.35	3.44	5.71
Alumina, . .	...	...	1.37	...	1.37
Lime, . .	4.45	5.07	3.23	4.72	17.47
Magnesia, . .	6.40	6.46	5.49	2.66	21.01
Potash, . .	22.91	24.11	20.67	8.57	76.26
Soda, . .	1.80	1.10	1.21	...	4.11
Chloride of sodium, .	2.12	5.06	4.19	2.89	14.26
Phosphoric acid, .	31.29	2.93	1.98	4.47	40.67
Sulphuric acid, .	1.97	4.56	3.64	1.41	11.58
Silicic acid, . .	109.70	133.00	106.79	98.97	448.46
	182.34	182.51	148.92	127.13	640.90

The point most worthy of attention in relation to this last stage, is the further diminution of the quantity of water contained in the plants, which had fallen from 9987.42 lb. to 6605.43. The loss, therefore, has been 3382 lb., which almost exactly corresponds with the diminished weight of the produce, which is 3526. The diminution is in fact somewhat greater in the latter than the former; and this might be supposed to indicate a small reduction on the amount of solid matters; but when the nature of the experiment is taken into account, it will be admitted that the approximation is as close as could be expected. The crop has in fact remained stationary during this last stage of its existence, and has ceased to take food from the soil. It had therefore reached maturity at a period nearly a month before it was reaped; and it may be inferred that harvest operations ought to have been commenced much earlier than they were. It is unnecessary, however, to observe that the period at which a crop is reaped is not always determined by that at which it acquires its full development. The

process of ripening in a cereal crop undoubtedly consists to a very material extent in getting rid of a part of the moisture it contains, so that it may pass into a state in which it is not liable to undergo those fermentations which are apt to occur when it is too moist, and which often end in its becoming musty or otherwise unsuitable for human food. The autumn of 1860 was exactly the season in which this operation was certain to be very much prolonged. During the latter part of August and beginning of September, the weather was damp and rainy, and there is no doubt that had it been drier, the crop would have been harvested at a considerably earlier period.

It is much to be regretted that the season in which these experiments were made should have proved so unusual and unfavourable. It would have been much more satisfactory had the year in which a series of analyses and observations, involving so immense a mass of labour, was made, been more of an average character, so that the results might have been more nearly such that might be expected in ordinary summers. It is seldom that a colder or more sunless season occurs, and this has no doubt had an effect in extending the period of active growth over a longer time than in a warm and dry summer. This, however, is only one of the risks to which all agricultural experiments are liable, and which render it so important that conclusions should not be drawn except from the results of repeated trials. In the case of an investigation like the present this is no doubt of less importance, inasmuch as the conclusions to be drawn from it must be the same in kind, though they differ in degree from those which would be attained in an ordinary year. In one point of view, perhaps, it may be considered not altogether disadvantageous, as it will admit of a more satisfactory comparison with the results attained with the turnip in the preceding year, which, like 1860, was wet and cold.

Viewing the results in a general light, it is impossible to avoid being struck with one fact which is at variance with preconceived opinions. It has been always supposed that wheat is a slow growing plant, and that this forms one of the most important characters by which, as an agricultural product, it is distinguished from the turnip and other root crops which are supposed to advance much more rapidly. The subjoined table shows that this idea is entirely without foundation. It gives a statement of the total amount of different substances withdrawn from the soil by the wheat crop at different periods of its growth, contrasted with the similar results obtained with the turnip in 1860.

TABLE

TABLE showing the Amounts of different Substances withdrawn from an Acre of Land by the Wheat and Turnip Crops at different periods of their growth.

Wheat.

Stage.	No. of Days.	Water.	Albuminous Compounds.	Other Organic Matters.	Ash.	Nitrogen.	Total Weight per Acre.	Daily Gain in Weight.	Daily Gain in Dry Matter.
1	—	1231.85	177.88		21.22	—	1430.96	—	—
2	34	4528.05	181.78	1030.46	146.71	29.11	5587.00	122.2	39.9
3	35	11970.24	413.25	5803.25	479.26	55.28	18666.00	373.7	181.0
4	35	9987.42	428.19	7791.12	566.27	66.76	18773.00	3.0	69.9
5	29	6605.43	482.67	7518.00	640.90	76.25	15247.00	121.5	4.9

Turnips.

Stage.	No. of Days.	Water.	Albuminous Compounds.	Other Organic Matters.	Ash.	Nitrogen.	Total Weight per Acre.	Daily Gain in Weight.	Daily Gain in Dry Matter.
1	32	208.22	5.76	11.55	1.6	0.92	226.2	7.02	0.58
2	35	14118.00	258.00	932.00	209.0	6.15	15555.0	113.80	40.50
3	20	30060.00	3012.00		522.0	—	33600.0	901.00	104.70
4	35	43211.00	612.00	3235.00	284.4*	97.50	48000.0	411.40	51.30

The most important point to be here noticed regarding the wheat, is that the gain in weight which occurs in the second and third stages, diminishes with great rapidity in the fourth, and is converted into an absolute loss of weight in the fifth. This is due to the loss of water, which diminishes rapidly during the last two stages. There is in the fifth stage, also, a slight diminution in the amount of solid matter, but this is trifling, amounting to less than 1 per cent of the entire crop, and is obviously attributable to the impossibility of obtaining two plots of ground absolutely alike. If now we trace the progress of the wheat crop, we find that the amount of matter accumulated by it during the winter is exceedingly small, so much so, indeed, that I have not thought it worth while to calculate the daily gain during that time. It is only in May that the progress becomes marked, and the most rapid gain in weight is seen to occur during the latter part of June and early part of July, when it amounts to 373.7 lb. daily. This no doubt will not bear comparison with the turnip, during the twenty days elapsing between the 11th August and 1st September, when the daily gain was 901 lb. per acre; but it must be borne in mind that this occurred during the rapid expansion of the bulb, the growth of which was most

* The greatly diminished quantity of ash here is due to the fact that a great part of the leaves, in which the mineral matters are chiefly accumulated, had decayed at this period.

conspicuous at this time, and consisted to a large extent of water If we look at the amount of dry matter, things assume a different appearance, for the daily gain in the turnip is only 104.7 lb., while in the wheat it amounts to 181 lb. If in place of comparing them at these individual stages, we take the entire period of active growth, embracing the third and fourth stages of the turnip, during which time chiefly the bulbs were produced, and the second, third, and fourth of wheat, it appears that the daily amount of dry matter withdrawn from the soil and the atmosphere by the former is 70.5 lb., by the latter 96.9 lb., or nearly 38 per cent more.

These results are totally opposed to the generally received opinion, for they tend to show that the growth of wheat is much more rapid than that of the turnip. It makes also a larger demand on the soil and air, containing as it does a larger quantity both of mineral substances and of dry organic matter. If, then, the exhaustive effects of a crop are dependent on its requiring to take a large quantity of matter from the soil within a limited space of time, we shall at once perceive that wheat must justly merit the reputation of exhausting the soil it has attained. It is generally understood that the narrow-leaved grain crops are to a great extent dependent on the soil for their carbonaceous matters, while the broad-leaved turnip can avail itself more readily of the carbonic acid and the other constituents of the atmosphere. If this is the case, the exhausting effects of a grain crop are easily intelligible, if it must take from the soil a large proportion of the elements necessary for its growth, depriving it in great part of the substances which happen to be in the most available condition, among which no doubt must be those which, under a less exhausting plant, would remain, and be the very substances most likely to be taken up by the subsequent crops.

I need scarcely dilate on the important practical bearings of an investigation like the present, which fixes the vegetative conditions of one of our most important crops, and I trust I may be able at some future period to prosecute a similar series of experiments with other plants. It would, indeed, be desirable to repeat such investigations more than once, but this is beyond the powers of an individual, owing to the laborious nature of the analyses and calculations, the extent and difficulty of which only a chemist can appreciate.

Abstract of the Accounts of the Highland and

Charge.

1. Balance in the Royal Bank of Scotland at 30th Nov. 1861,				£1665	17	4
2. Medals on hand at do.,				31	7	6
3. Arrears of Subscriptions at do. considered recoverable,	£249	14	6			
Deduct balance of Arrears overstated in last accounts,	4	13	6			
	£245	1	0			
Whereof due by Members compounding for Life, and thereby extinguished,	57	17	0			
				187	4	0
4. Interest and Dividends—						
1. Interest on £9500 lent on Heritable Security,	£365	15	0			
,, On £5570 lent on Debenture Bonds,	238	10	3			
,, On Bank Accounts,	28	2	1			
	£632	7	4			
2. Dividends on £11,670, 14s. 1d. of Bank Stocks (the value of which at 30th Nov. 1862 is £22,851, 11s. 5d.),	892	12	10			
				1525	0	2
5. Annual Subscriptions for the year,				867	18	6
6. Life Subscriptions,				718	4	0
7. Chemical Department—						
1. Balance in Bank at 30th Nov. 1861,	£1	18	9			
2. Annual Subscriptions,	133	7	6			
				135	6	3
8. Subscriptions in aid of Local Competitions,				84	5	0
9. Perth Show, 1861.—Receipts as per Abstract,				2884	16	11
10. Receipts applicable to former Shows,				4	17	0
				£8104	16	8

Edinburgh, 24th Dec. 1862.

Agricultural Society of Scotland, for the Year 1861-62.

Discharge.

1. Establishment Expenses—		
1. Secretary's Salary,		£500 0 0
2. Allowance for Heating, Cleaning, and Service,		83 5 0
3. Auditor's Fee,		30 0 0
4. Allowance to Editor of 'Transactions,'		42 0 0
5. Clerks' Salaries,		161 17 0
6. Allowance to Curator of Machinery,		10 0 0
7. Feu-Duty, Taxes, Repairs, &c.—		
Feu-Duty,	£40 10 0	
Taxes,	45 2 2	
Insurance,	5 17 0	
Water-Duty,	6 3 4	
Repairs,	81 19 10	
		179 12 4
		£1006 14 4
2. Chemical Department.—Salary to Professor Anderson,		300 0 0
3. Expenses of Veterinary Department—		
1. Allowance to Professor Dick,	£26 5 0	
2. Medals awarded to Students,	6 8 0	
3. Advertising,	6 13 6	
		39 6 6
4. Museum Expenses—		
1. Feu-duty, Taxes, Water-duty, &c.,	£78 18 8	
2. Repairs,	19 17 9	
3. Wages to Porter,	37 10 0	
4. Coals,	7 0 0	
		143 6 5
5. Premiums Paid—		
1. For years prior to 1861,	£60 10 0	
2. For Essays and Reports,	111 10 0	
3. For Perth Show, 1861,	1238 17 0	
4. For Battersea Show, 1862,	403 0 0	
5. For District Competitions, 1861,	716 4 0	
		2530 1 0
6. Battersea Show Expenses—		
1. Tents and Bedding for Servants,	£68 12 3	
2. Outlay for do. at Exhibition and Crystal Palace,	27 15 4	
3. Cab Fares and other Conveyances,	6 18 6	
4. Police,	6 6 0	
5. Advertising,	15 14 6	
6. Postages, Carriages, Telegrams, &c.,	14 13 1	
7. Printing,	10 0 0	
8. Travelling Expenses of Secretary,	17 2 0	
9. Secretary's Maintenance Money,	19 19 0	
10. Silver Medal to Mr Gibson, Battersea Park,	0 16 0	
11. Gratuities and Sundries,	1 14 6	
		189 11 2
7. Printing, Advertising, and Stationery—		
1. Printing,	£167 13 6	
2. Advertising,	26 14 5	
3. Stationery,	28 0 0	
		222 7 11
8. Miscellaneous Expenses—		
1. Subscription to Memorial to Prince Consort,	£52 10 0	
2. Subscription to Meteorological Society,	5 0 0	
3. Portrait of Highland Bull,	28 0 0	
4. Account for Seed-Potatoes and Manure for Experiments,	39 5 4	
5. Expenses attending purchase of National Bank Stock,	8 0 0	
6. Business Accounts,	18 10 6	
7. Reporting General Meetings,	3 3 0	
8. Postages and Receipt Stamps,	61 14 6	
9. Incidental Outlays, including Travelling Expenses, £3, 11s.; Cabs, £1, 7s. 6d.; Acts of Parliament, &c.,	15 4 10	
		231 8 2
9. Perth Show, 1861.—Expenses per Abstract,		1747 18 11
10. Balance in Bank at 30th November 1862,		1382 7 3
11. Medals on hand at do.,		26 16 0
12. Arrears of Subscriptions—		
1. Recoverable Arrears,	£202 2 0	
2. Irrecoverable, and written off,	82 17 0	
		284 19 0
		£8104 16 8

W. GIBSON CRAIG, ...*Treasurer.*
JAMES W. HUNTER,.........*Member of Finance Committee.*
H. MAXWELL INGLIS,.......*Do. do. do.*
KENNETH MACKENZIE,...*Auditor.*

PERTH SHOW, 1861.

RECEIPTS.

1. LOCAL SUBSCRIPTIONS—						
1. Proprietors in Perthshire,	£475	6	8			
2. Tenant-farmers in ditto,	56	19	10			
3. Proprietors in Fifeshire,	308	1	2			
4. Tenant-farmers in ditto,	24	19	6			
5. Proprietors in western part of Forfarshire,	141	8	4			
6. Tenant-farmers in ditto,	7	2	3			
7. Proprietors in Clackmannanshire,	31	4	6			
8. Tenant-farmers in ditto,	9	14	6			
9. Proprietors in Kinross-shire,*	0	0	0			
10. Tenant-farmers in ditto,	0	17	6			
11. Citizens of Perth,	38	19	0			
				£1094	13	3
2. AMOUNT COLLECTED DURING SHOW—						
1. Drawn at Gates,	£1118	1	4			
2. Drawn at Trial of Implements,	29	16	6			
3. Farm-servants' Tickets sold,	13	7	0			
4. Catalogues and Awards sold,	167	10	0			
				1328	14	10
3. ENTRY-MONEY—						
1. On Stock,	£63	15	6			
2. On Implements,	64	9	6			
				128	5	0
4. Rent of Stalls in Show-yard,				254	8	6
5. Rent of Refreshment Booth,				45	0	0
6. Manure sold,				22	0	0
7. Profit upon Banquet,				4	9	3
8. Interest from Banks,				7	6	1
				£2884	16	11
9. Balance,				101	19	0
				£2986	15	11

* Not yet reported.

EDINBURGH, *24th December* 1862.

Abstract of Accounts.

Payments.

1. Premiums drawn at 30th November 1862,			£1238 17 0
2. Show-Yard—			
	1. Contractor for fitting up Show-yard,	£965 6 0	
	2. Tenants of Inch,	20 0 0	
	3. Bedding for Stock,	75 0 0	
	4. Water Fountains and Pipes,	12 5 0	
	5. Refreshments for Judges and Committee in Yard,	7 5 9	
	6. Omnibus and Cabs for Judges,	6 14 6	
	7. Food for Poultry,	1 8 3	
	8. Colours,	6 14 0	
			1094 13 6
3. Trial of Implements—			
	1. Rent of Ground at Muirton,	£31 15 0	
	2. Do. Friarton,	12 0 0	
	3. Gratuities, and Refreshments to Ploughmen,	6 0 6	
	4. Oil-cake, Roots, Straw, &c., for Machines,	8 16 4	
			58 11 10
4. Police Force,			29 14 9
5. Travelling Expenses of Judges, Staff, Secretary, Clerks, &c.,			92 9 6
6. Hotel Bills for ditto,			118 15 6
7. Tickets to Banquet for ditto,			14 12 6
8. Printing—			
	1. Catalogues,	£89 10 0	
	2. List of Awards,	12 3 6	
	3. Bills and Placards,	23 9 0	
	4. Premium Lists, Certificates, Circulars, &c.,	48 14 0	
			173 16 6
9. Advertising—			
	1. At Railway Stations,	£20 0 0	
	2. In Newspapers,	25 4 6	
			45 4 6
10. Allowance to Local Secretary,			20 0 0
11. Outlay by him,			5 5 0
12. Allowance to Curator of Machinery,			9 9 0
13. Ditto to Bank Collector,			5 6 0
14. Clerks,			30 10 0
15. Assistants, Porters, and Labourers,			12 2 3
16. Postages,			28 5 1
17. Stationery,			2 16 8
18. Miscellaneous Expenditure,			6 6 4
			£2986 15 11

W. GIBSON CRAIG, ...*Treasurer.*
JAMES W. HUNTER,.........*Member of Finance Committee.*
H. MAXWELL INGLIS, ...*Do. do. do.*
KENNETH MACKENZIE, ...*Auditor.*

State of the Funds of the Highland and Agricultural Society,

At 30th November 1862.

I. Investments—			
1. Heritable Bond,	£9,500	0	0
2. Bank Stocks, present value,	22,851	11	5
3. Railway Debentures,	4,570	0	0
4. Glasgow Water Corporation Debenture,	1,000	0	0
5. Ten Shares, or £500, of the British Fishery Society,	200	0	0
	£38,121	11	5
II. Heritable Property, per Valuation,	7,487	18	5
III. Balance in Royal Bank,	1,382	7	3
IV. Medals on hand,	26	16	0
V. Arrears considered recoverable,	202	2	0
	£47,220	15	1

Abstract of the Accounts of the Argyll Naval Fund for 1862.

Charge.

1. Balance in Royal Bank of Scotland at 30th November 1861,	£426	8	10
2. Interest on £3000 Heritable Security,	115	10	0
3. Dividends on £1700 Debentures,	65	9	0
4. Progressive Interest on Bank Account,	7	10	11
	£614	18	9

Discharge.

1. Allowance to four recipients,	£160	0	0
2. Balance in Royal Bank at 30th November 1862,	454	18	9
	£614	18	9

Edinburgh, *24th Dec.* 1862.

KENNETH MACKENZIE, *Auditor.*

ON JOINT-ILL IN CATTLE AND SHEEP.

By JAMES M'GILLIVRAY, V. S., Rayne, Aberdeenshire.

[Premium—The Gold Medal.]

PRELIMINARY REMARKS.

IN writing on diseases of animals, more especially when such writings are principally intended for the benefit of non-professional persons, if there is one rule of more value than another, and which as anatomists and pathologists we should always keep before us, it is, to explain the pathological changes which we meet and detect in the course of our investigations in terms so plain, distinct, and explicit that they may be understood by all, and to name the various features of disease as much as possible in accordance with their pathological character.

In the present time, thanks to the more general diffusion of intelligence, professional matters are not so obscure to the general reader as they were a few years back, consequently it is easier to write *now* on physiology and pathology than it was in former times.

Keeping these observations constantly in view, I shall endeavour to explain in what pathological changes of structure diseases of joints in the lower animals consist, as commonly met with in an extensive country practice, and over a number of years.

STRUCTURE OF JOINTS, AND THE NATURE OF JOINT DISEASE.

Without exception, every normal sound joint is a closed cavity, impervious to the external air, the internal lining membrane of which belongs to the class called *serous* membranes; its purpose, in health, being to supply the joint or articulation with a lubricating fluid vulgarly called the joint-oil or synovia, and is itself named the synovial membrane. Nature by furnishing this fluid facilitates the motion of the joint, and prevents the friction of its different parts during progression, &c.

The extremities of all bones forming joints or articulations are covered by a firm substance called cartilage, having a beautiful hyaloid articulating surface. All joints are partially held in position by a ligament that embraces the whole of the joint, named the capsular ligament. The synovial membrane already referred to lines the interior surface of this capsular ligament, and is reflected over the articular cartilage—thus, as has been said, forming a closed cavity.

The joints of animals, being constructed of many and delicate parts, and, moreover, being frequently subjected to inordinate action, might naturally be supposed to be subject to many and various affections and injuries, all resulting in disease: *and such is the case.* In the following paper the writer proposes giving part of his own

experience, personal and acquired, on the above-named subject—diseases of the joints in cattle, sheep, &c.

In accordance with the observations now made, in practice there are found many sources and varieties of joint disease. I have referred the principal to five heads: *first*, Tubercular Diathesis; *second*, Idiopathic Synovitis; *third*, Deposit of pus in joints from sources within the body; *fourth*, External Injuries, the result of accidents, &c.; and *fifth*, Rheumatism. By some this division may be regarded as arbitrary, or more convenient than *real*—as, for instance, general rheumatism may be accompanied by, or pass into, synovitis; again, any severe injury to the joint, such as a blow, a sprain, or puncture into the cavity, &c., will most likely produce synovitis in that joint; and again, synovitis, when allowed to go on unchecked, rapidly produces, or passes into, other and more severe affections—such as suppuration, the result of purulent inflammation, followed by ulceration of the synovial membrane, periosteum, and bone, &c. Thus disease of the synovial membrane is the primary *tangible* form of almost all real joint disease. Besides these, there are other incidental matters, such as the urachus remaining pervious and containing pus, phlebitis, &c., which I shall refer to in giving cases in practice, &c.

Under inflammatory action, from whatever cause, the first change that takes place in the secretion of the synovial membrane is not well understood; however, the membrane, having the characteristics of other serous membranes and closed cavities while in a state of health, may be fairly supposed to exhibit the same pathological changes under inflammation as they do. Such being the case, then, the cavity of a joint in the earliest stages of simple inflammation has its natural secretion arrested. I have no decided experience, however, whereon to establish this as a pathological fact, and give it as a probability merely.

The first positive result which we meet is an excess of secretion—every opening between the bones becomes bulged out, distended, prominent, and tender: there are exceptions, in a few chronic forms, where, in cattle that have wrought, the distension is permanent and not painful.

In acute cases of synovitis, flocs or shreds of stuff resembling coagulable lymph are found adherent to, and scattered over, the internal surface of the synovial membrane, covering the capsular ligament, and, in some few instances, I have found the same substance on the synovial membrane covering the cartilage. The fluid contained within the cavity of the joint is very soon either wholly converted into, or is much mixed up with pus. In all such cases there is extreme pain evinced on pressure or the slightest attempt to move the joint: and, in some cases, the synovial membrane will be found ulcerated, easily torn, and its integrity and structure all but gone.

I have already stated that on the ends of bones forming the

articulations, and under the synovial membrane, there is an intermediate substance deposited, named cartilage. These cartilages belong to the class of tissues called, in pathological language, *non-vascular*, and are themselves very sparingly, *if at all*, supplied with blood-vessels, and that on the surfaces only—certainly they do not assist in circulating or conveying the blood to other tissues. The substance of cartilage is itself nourished partly from the synovial membrane, but principally from the bones to which, in health, it is attached; this is proven by the trustworthy and minute investigations of Toynbee, Bryant, and others. There are before me, prepared by Mulder, Donders, and others, between fifty and sixty specimens of cartilage from various parts of bodies, some of them prepared by maceration in simple water, in sulphuric acid, in muriatic acid, in ether; exhausted by ether, by acetic acid; by maceration in solution of potash; also dried cartilage and transverse section of same. These specimens are magnified from 120 to 410 times, and exhibit the natural structure in health, and the altered structure in various states of different diseases. I have also examined for myself various specimens of cartilage under the microscope—with powers ranging from 100 to 700 diameters—exhibiting the cells with nucleus and nucleolus, cartilage bodies in lines with nuclei enclosed, the beautiful hyaline substance in healthy cartilage, &c. I never could discover, however, the smallest trace of a blood-vessel or blood in cartilage; still there are physiologists of a very high class, that record having seen them.

There are at least two primary forms of cartilage, named respectively the *true* and the *fibrous* cartilage. All the cartilages covering articulations belong to the class of true cartilages; and, in the mean time, it is with them only we have got to do.

The blood-vessels on either side form loops just in contact with the cartilage; and thus the cells of the articular cartilage *imbibe* their nourishment from them. Plain it is, then, that these non-vascular structures which derive their nourishment by *imbibition* from the blood-vessels of other tissues, must depend on the integrity and healthy action of those tissues; and if at any time or from any cause the primary nutrition is interfered with—either diminished in quantity or vitiated in quality—then the cartilages must suffer. In many cases of joint disease they are atrophied; in others they are loosened from their bony attachment or from that of the synovial membrane, and in this detached state they are dead matter, act injuriously as foreign bodies in the joint, or may be slowly dissolved—the pus in the joint acting as a solvent. When they completely disappear, I may mention that their non-vascularity prevents their inflammation; neither can they ulcerate. Much has been written about the ulceration of cartilage; I believe there can be, strictly speaking, no such thing.

I have also before me many examples of bones examined under

high magnifying powers, from 25 to 410 diameters, and carefully manipulated by Von Bibra, Scheerer, Donders, and Mulder. I have also, myself, examined several specimens of bones, under microscopic powers ranging from 100 to 700 diameters. Scientific investigation has recently proven beyond doubt that during health the effete, worn-out substance of bone is removed by absorption into the blood circulation: the substance of bone is liberally supplied with blood-vessels, and has an active circulation; this absorption and consequent discharge being immediately preceded by a process of interstitial decline and death in minute particles within the substance of the bone; and the place that was lately occupied by this now effete, dead matter, supplied from the same source—the living organism, the blood circulation.

It need be no surprise, then, that organs in which there is constantly going on vital actions, so rapid in their progress, so delicate and essential in their nature, should be at times deranged in their functions, especially from attacks of inflammation; and that these inflammatory attacks, if severe, prolonged, or often repeated, should prove destructive to the integrity of the bone or bones in which they take place.

The first direct evidence that I have seen of disease of bones is the unnatural enlargement of their articular extremities. I have often met with them enormously enlarged, especially in disease of the stifle-joint—generally both the lower extremity of the femur and the upper extremity of the tibia; I rarely met with a case in which the patella is involved farther than that its articular surface will be affected. Again, when the hock-joint is the seat of the disease, along with all the bones of the joint, the *os calcis* never escapes—it often is so diseased that the insertion of the tendo-Achilles gives way, and of course the leg is utterly useless. I have repeatedly met with cases where the inflammatory action ran so high or continued so long in the bone that partial death of it was the result; and, knowing that no good cure could be effected while the dead substance remained within the living organism, I have occasionally removed necrosed bone from various diseased joints of cattle, and they have uniformly healed readily after.

Cartilage is never under any circumstance reproduced; and if we have reason to believe that the cartilages of a *joint* are destroyed, *gone*, then the joint as a joint is gone also; no process or treatment can restore its integrity. Bone is, however, very readily reproduced; and, if we can bring about a healthy *action* in the joint, we may have the beast perfectly able to collect its food, and in every way suitable for feeding or fattening—with a stiff or anchylosed joint, the result of the reproduction of bony matter in a plastic and healthy state.

My experience goes to prove that in cattle a very well-marked distinction exists between joint diseases that follow and are appar-

ently the result of rheumatism, and joint diseases that accompany a strumous diathesis; true, these two may be complicated in one subject, but this I have not found to be common. In joint affections that belong to the rheumatic, the soft parts about the joints are only affected, at least for a considerable time—the synovial membrane all over, and the ligaments slightly. I have met with cases of this kind where the animal could scarcely stand, and still there was very little distension about the joint, and certainly very little heat externally; internally the joint was diseased, and in almost every case I found *matter*, *pus*, formed in the cavity. Moreover, in the rheumatic patient several joints are often affected at the same time, while in the strumous patient I have rarely seen more than *one* joint affected at once; and in these latter cases the disease apparently commences in the articulating surfaces and the extremities of the bones—among the first symptoms being their enlargement, the result of inflammatory action.

I may here mention that I have never met with joint disease resulting from rheumatism in the sheep. All the cases that I have met with in sheep were in animals affected with tuberculosis. In the last case of a diseased sheep that came under my notice, and which I particularly examined, I found the bones completely spoiled—they were quite black on both sides of the joints; and, on cutting up the carcass, I found tubercles in clusters about the lungs, the liver, the mesentry, the kidneys, and bladder—in fact every way excepting about the heart. From my experience I would infer that sheep are not so liable to rheumatic affections as they are to strumous diseases and their resultants, &c. The truth is, the *coat* and the *carcass* of the sheep being in most cases worth something to the owner, more of them—that is, a greater proportion of sheep than of cattle—are slaughtered when there is anything amiss with them, and, consequently, there are not so many of them brought under treatment as there are of cattle. I believe this state of matters, this practice, may be right and proper, as sheep, from their circumstances, their habits, and the organic arrangement of their bodies, are not so amenable to treatment as are cattle. On the whole, I consider them more healthy than cattle; and, if we except the single disease of foot-rot, sheep are not so subject to local diseases as cattle are, the diseases that they suffer from being in most cases constitutional. In diseases of joints, whether purely local or constitutional, absolute *rest* to the affected animal is necessary if it could be had, but the habits of the sheep are ill adapted for the accomplishment of this indication. Indeed, in the swellings that occur about the knees in lambs, rest and frequent warm fomentations is often all that is required to put them to rights.

Any small matter that I have now passed over in the description of the diseases will be brought out when I give illustrative cases, their treatment, and its results.

REMOTE CAUSES OF JOINT-ILL.

From observations made on the manner and frequency with which joint diseases occur amongst cattle, I am led to form the opinion that there exists a constitutional tendency among cattle to disease of joints; and that this tendency is most evident in what is called the pure shorthorn breed, next in crosses between them and the different black breeds, and crosses common to Scotland. A strumous diathesis, or a tendency to tuberculous consumption and rheumatic affections, are the most common, and are clearly communicable from generation to generation, from sire to son, as are certain points of external conformation; which fact is well known to every intelligent breeder of cattle, and forms the basis of improvement in breeding—"*like produces like.*"

There is before me a letter from an extensive farmer and successful practical breeder of cattle; in this letter he writes:—"With the progeny of a single cow I have taken fifty prizes. I have taken first prizes at every show where I was an exhibitor—on the Continent, in various part of England, and in Scotland." Now it is evident that the excellences of this cow were transmitted from her to succeeding generations; and there cannot remain a doubt in the mind of any sane man but that bad qualities, whether in conformation or constitution, will also, on the same principle, become transmitted from one generation to another. At a farm not many miles from the place where I now write, the farmer, Mr A., had a sale of bulls during last February. These bulls fetched long prices, but they have not all turned well out, a few having been lost from joint disease. Another farmer, Mr B., has a farm in a totally different part of the country. Some few years ago this Mr B. purchased a shorthorn bull at a sale then held by the aforesaid Mr A. During last February Mr B. also had a sale of shorthorn bulls, the progeny of the bull purchased by him a few years back at the sale already referred to. These bulls also brought high prices, and, according to authentic report, they have also turned out badly. The objects of both sales were, of course, from the *same stock;* and, although raised in different parts of the country, and most likely under different circumstances, and subjected to different treatment, yet are found exhibiting the same phases of physical character, and the same tendency to disease clinging to the family from generation to generation—some exciting cause being only necessary to develop the disease, in such cases the seeds being latent in the constitution.

From this circumstance and similar ones that might be given, it will easily appear how necessary it is to get the antecedents of a stock before one purchases from it animals of considerable value, more especially to breed from. The shorthorns, being natives of a warmer climate than Scotland, do not withstand the vicissitudes of Scotch weather so well as could be wished.

Another cause of weakness in certain families of cattle is said to arise from the breeding *in-and-in* system; that consists in breeding from near relations, such as a bull serving sisters, &c. I do not pretend to give an opinion with certainty on such cases; we are not in possession of data sufficient to enable us to form a correct opinion *on the merits*, &c.; but, judging from corresponding features in breeding, one would imagine that whatever formed a source of weakness or of strength in the family would be perpetuated by the system; we can, however, scarcely conceive how the mere fact of breeding from relatives in the brute creation should *give rise* to constitutional weakness, or be the means of *producing* and perpetuating animal imbecility.

PROXIMATE CAUSES OF JOINT-ILL.

Where there may exist any tendency to a tuberculous diathesis, one fertile source of its development is damp, ill-ventilated, dirty-kept byres. In such ill-assorted places calves are often confined for weeks or months, are never allowed exercise or a mouthful of fresh air; the stalls are not cleaned once a-month, and, consequently, such calve-houses are so abominably fœtid and disgusting that nothing but sheer necessity would make a person enter them. Animals cannot live in such places and escape disease—scarcely if they were originally sound could they escape—such circumstances being amply sufficient to gender and give rise to or lay the foundation of tubercular and rheumatic affections. In the 'Cyclopedia of Practical Medicine,' at page 316, vol. iv., Sir James Clark says:—"Most of the milch cows in Paris become tuberculous after a certain period of confinement to the house; and we have been informed that, for some time after the disease has commenced, the quantity of milk obtained from them is greater than before, and their flesh is more esteemed by the unsuspecting epicure than that of the healthy animal." This shows the danger of confinement, and the insidious nature of the disease.

I have seen rheumatism in various forms, and complicated with or resulting in joint disease, in over 547 cases of animals of the cattle kind, none of them more than six months old when first affected. I have also met with cases of disease of lungs and joints in animals subjected to confinement. I have had bad cases of rheumatism and disease of joints brought on by the young calves being confined closely for a considerable time and then turned at once from a comparatively warm house into an exposed park—many enclosures having no shelter, the fences being simply a wire paling—there to remain in cold weather and hot, by night and day. Again, I find often when calves are kept tied up in filthy and close dark houses for many weeks, all at once the owner turns them out to perfect freedom; the young creatures are wild, and, if able, gallop round and round until they tumble over, or until some accident

happen to them, or they are perfectly exhausted; and the next day they have rheumatism, are scarcely able to move; in a few days more one leg is dangling useless at the animal's side, and on examination one or more of the joints are found hot, swollen, and exceedingly tender.

I have also met with neglected or spoiled cases of foul-in-the-foot, resulting in disease of the joints. When a bad case of foul-in-the-foot is neglected—and any case may be made bad by neglect—left without proper cleansing, or the necessary medicinal applications, then the disease works itself up between the digits until one or more of the joints, generally on one side only, become affected. Often the joint between the coffin-bone and the os-corone, sometimes the joint between the os-corone and the pastern-bone, or perhaps both of these joints, are involved. I have found them so badly affected that I have removed the navicular bone, it being dead matter, freed from all its attachments by the disease about the joint, the cases doing well after.

I have on record a case of injury to the stifle-joints of two valuable cows, the property of one gentleman. This gentleman's byres were laid on the floor with wood; on this wood the cattle stood day and night. The plan was said to save much straw, and keep the cattle comfortable indeed. Whether there was anything faulty about the construction of the wooden floor in this byre, I am not aware; but certain it is that, when these heavy cows were getting up, often their hinder legs would slip from behind them, they dropt on the belly, and the stifle-joints came in violent contact with the wooden floor: by repeated bruises of this nature the animals became so diseased in the joints that they were both destroyed.

And I have often met with diseased knees in cows, the result of rising with their knees in contact with rough bare stones.

In cattle having a constitutional weakness, or a natural tendency to disease—say a strumous diathesis—joint affections are much more easily induced than in others having a hardy constitution. On the latter, ordinary exciting or depressing causes have little influence, at least not a lasting or ruinous effect; while the scrofulous beast is in imminent danger from every exciting or depressing circumstances—such as low, damp, ill-ventilated houses, where the want of good air and cleanliness induces a close and suffocating atmosphere, &c.—a want of the necessary amount of exercise—moderate or slight injuries; these are a few of the commonest sources of the development of joint diseases; and, but for such proximate causes, the disposition might remain dormant in the constitution during the life of the beast.

And, again, idiopathic, spontaneous disease of any organ may be the result of a faulty or deficient nutrition. This may be due to improper feeding; the food may be meagre in quantity, or deficient

in the necessary elements, to afford the nourishment required by the various organs, tissues, &c., of the animal system. The natural operations of nutrition and change of materials that are constantly at work in every healthy body constitute together *one whole action.* Dr Carpenter writes:—"The abstraction of the material required for each part leaves the blood in a state fitted for the nutrition of other parts—proves that such a mutual dependence exists amongst the several parts and organs of the body, as causes the evolution of one part to supply the conditions requisite for the production of another." And, to use the language of Paget, "the development of each organ or system, co-operating with the self-development of the blood, prepared it for the formation of some other organ or system, till, by the successive changes thus produced, and by its own development and increase, the blood is fitted for the maintenance and nutrition of the complete organism or animal body." The self-development of the blood here referred to, can only take place in complete accordance with the materials supplied to the animal in the matters of food, water, air, and exercise. The power of the animal system to elaborate the materials furnished, so as they may form integral portions of its own blood, greatly depends on its being allowed the necessary amount of exercise in a healthy place. If the stockmaster wishes to preserve a healthy stock, he must study to know and fulfil these conditions.

TREATMENT, AND CASES ILLUSTRATIVE OF SAME.

The first and most simple appearance of joint disease that I find among the lower animals, occurs in calves from four weeks old. Often about that age, or after, the little animal is found some morning attempting to stand or walk on three legs—the fourth dangling useless by its side. On examining this useless limb, one joint is found *enlarged, hot,* and *tender;* if a hind leg, it is commonly the stifle or hock; if a fore leg, it is commonly the knee or shoulder-joint that is affected. Generally, within two days of the first attack, the soft parts about the affected joint will be found puffed out; this is due to an increased quantity of the fluids about the joint distending the capsular ligament, which in this state bulges out at every opening between the bones of the articulation. Although the joints now mentioned are the most common seats of this affection, occasionally it will be found in any joint.

If the breathing is hurried, and unmistakable symptoms of fever are present, then I abstract a quantity of blood corresponding to the degree of fever, the age and size of the affected beast, and give laxative or purgative doses of medicine as the case requires. In severe cases this treatment may require to be repeated; in prolonged cases, again and again. The fever must be kept down, and the bowels kept under the action of medicine as long as there is any constitutional disturbance present; this is necessary whether

the animal be young or old. If the case has been neglected, or if stimulating medicines are applied—which country people are apt to do—the joint commonly suppurates, its integrity is destroyed, and the animal, or *limb*, so affected often rendered useless. So soon as a case such as that now described occurs, the cooling evaporating lotion, No. IV. (page 466), should be applied, and this cannot be too frequently done; no friction to be used, and no covering put on the affected part. The *modus operandi* of this lotion is—that spirits evaporate, reducing the temperature; and the strong vinegar, formed by the acetic acid and water, keeps the parts cool, and, in the great majority of cases, reduces the inflammation altogether. I repeat that, where this application is sufficiently early had recourse to, and duly persevered with, I have never had a single case but was *improved* by it, and comparatively few but were completely cured; and I have prescribed it for more than five hundred patients.

If I meet with cases that have been neglected or spoiled by stimulating applications, but no suppuration present, then I have found most benefit by passing setons over the affected joint. The instrument named the seton-needle, proper for the insertion of setons that pass over joints, requires to have a peculiar shape, should be about 10 inches long, a good deal bent; a pretty large eye in each end, with a blunt point—what is called a "probe point." This instrument is let into the skin by making a wound of about half an inch with a rowelling-scissors; and, after the needle has traversed over the joint, beneath the skin only, to the proper place, it is allowed to escape from under the skin by a wound made with the scissors after the same manner. The material which I have found best adapted for a seton in such cases is a piece of strong broad tape-wick; strong digestive ointment to be put on the middle of a suitable length of the tape; and, after drawing it over the joint under the skin with the needle, the two ends of the setoning string are fastened together, and all is right. The seton must be shifted daily, and, at the same time, smeared with fresh ointment, and to be retained and kept in operation as long as its presence is considered beneficial. If the diseased joint has suppurated, then the matter or pus must be allowed to escape by free incisions, and blistering resorted to.

I shall now proceed to give a few illustrative cases, the treatment adopted, and the results.

Case I.—Of a sheep, is recorded at page 459. *Tuberculous.*

Case II.—I made a post-mortem examination of the carcass of a cow that had had disease of the stifle-joint; had been actively treated, both constitutionally and locally. By the treatment the joint was reduced in size; the active disease was removed; and it

was known to be becoming anchylosed, when, almost at once, she exhibited unmistakable symptoms of consumption; took very little food; responded to no medicine; fell rapidly off in condition; eyes sunk; neck long and narrow; spine arched like a razor-back fish; the skin apparently glued to the ribs, and to every part of the almost skeleton body. The owner had her destroyed. The lungs and almost all the viscera were studded over with tubercles in every stage of development. On laying open the diseased joint, there were large formations of new bony matter passing between the *tibia* and *femur*, the elevations of the one side corresponding to the depressions of the other; there was no cartilage to be distinguished; the patella was adherent to the mass; in some of the cavities there was pus, very thick pus; and in some places of the joint the matter was of a cheesy consistency, evidently strumous, but having no deposit of bone earth, at least none consolidated: other cavities were filled with something resembling coagulated blood; no smell whatever. Grinding the teeth was one of the living symptoms of this animal, and I have invariably found that where there exists this grinding of the teeth, the digestive system is acid; and, moreover, where this acid state of the system exists and prevails, even for a moderately lengthened period, there is uniformly a constitutional tendency to deposit bone-earth, often in the form of lime-salts. I have taken this lime-salts from tubercles formed on the mesentry, in the lungs, and about the kidneys, and have had them—the salts from tubercles—examined under the microscope, with powers varying from 200 to 700 diameters; have had them tested chemically, and am certain of their nature and composition. I am also convinced, from observations made during many years, and on a number of cases, that the peculiar state of the skin in animals which we call *hide-bound*, and which in all cases accompanies this affection, does not depend on the skin being essentially faster to the ribs than natural, but arises from the fact that there exists an acid state of the digestive system, and under that state there is a deposit of lime-salts, bone-earth, &c., in many organs of the body, and, amongst others, in the substance of the skin. These deposits destroy its softness and pliancy, and by their presence render its texture dense, firm, and non-elastic, and more difficult to be raised by the hand than a healthy skin—this constitutes *hide-bound*.

I believe the state of the constitution now described was favourable to the production of anchylosis in the diseased joint of this cow, but the tubercular diathesis prevailing to such a fearful extent made the general health give way, and the animal had to be destroyed.

To counteract this acid state of the digestive system so common in cattle, and so productive of organic mischief in the animal system, I give alkalis and vegetable bitters, with mineral tonics,

commonly some preparation of iron, often the powders Nos. V. and VI. alternately, in five gills of linseed gruel, or some modification of these according to the size of the beast and the urgency of the case.

Case III.—A cow of the pure shorthorn breed, purchased at seventy guineas from the stock of a Mr Crofton, a breeder near Durham, was one day observed very lame on the left hind leg. Very soon I was requested to attend her; found the stifle-joint enlarged, hot, tense, and very tender; bled from the neck to 5 quarts; gave a dose of purgative medicine; had the animal kept quiet and at perfect rest. At frequent intervals kept bathing the tumified joint with a cooling lotion composed of—

No. IV.	℞ Acetic acid, . . .	1 gill.
	Spirits of wine, . . .	2 gills.
	Water, ...	2 gills.
		Mix.

After continuing this local treatment for upwards of two weeks, and finding little or no improvement in the ability to walk, but the joint much cooler and less tumified, I commenced treating it with ointment composed of—

No. III.	℞ Iodine, ...	ʒ ij.
	Iodide potassium, . .	ʒ j.ss.
	Lard, ...	℥ ij.ss.
		Mix.

This ointment was, with a good deal of smart friction, frequently applied to the surface of the diseased joint, also for a small way around it. At the same time I had the bowels kept under the action of laxative medicine, and exhibited by the mouth—

No. II.	℞ Iodide potassium, . .	Grs. xl.
	Iodine, ...	Grs. x.
	Ginger, pulverised, . .	ʒ j.
		Mix—one dose.

This dose given in thin gruel, made by boiling linseed in water—one Scotch pint of this gruel to each dose; one dose given in the morning and another in the forenoon, and continuing this daily for one week; then stopping the treatment for one week, and so on, resuming the same treatment every alternate week for some three months. The joint was ever after stiff, but very much improved indeed. I may here mention that I believe much of the iodine exhibited by the mouth is, in such cases, eliminated by the kidneys, as, during its exhibition to this cow, the urine showed the characteristic blue colour on being tested by a thin solution of starch containing a small quantity of free chlorine. The ultimate history of this animal is that she becamc affected with tuberculous consumption, and had to be destroyed.

Case IV.—I recently had the privilege of making a post-mortem examination of a young animal that had idiopathic synovitis of three principal joints, all on the right side; it could not walk but with great pain and difficulty, and, being apparently a hopeless case, the owner had it destroyed. Before I saw it first, the capsular ligament of the diseased joint was enormously distended; the ends of the bones enlarged, and all round the joints very tender, the animal evincing great pain on the slightest pressure. On laying open the diseased joints, I found the synovial membrane a good deal injected; the fluid contained in the joints was not so glairy as natural, was much thinner, and mixed up with innumerable shreds of very tough, coagulable lymph; much of this partially organised lymph was adherent to the synovial membrane, and at one particular spot a good deal of it adhered to the articular surface. Although the disease was said to have existed for three or four months, in no part was the cartilaginous surface abraded. The stifle-joint was one of those affected, and both the semilunar cartilages were entire. In none of the viscera of this beast could disease be detected; and, as it sucked its mother, I believe very little was known about the state of its digestive system. There was no treatment in this case.

Case V.—I was called to a beast with the hock-joint in a fearful state; enlargement and suppuration; at three points, one outside, one inside, and one almost in front, it was apparently ready to burst; the animal could not put the limb to the ground at all. I opened all these places freely, and an immense quantity of purulent stuff escaped; the animal was then relieved of the pain, but could not use the limb at all. I had the joint frequently dressed with lotion No. VIII. (page 472) for two weeks, and then blistered the joint all round with a blister. It rapidly improved, and in the following winter I fired and blistered the joint again; and, excepting that the joint is a good deal enlarged, the limb is as useful as its fellow that was never diseased. This case existed some weeks before I was called to attend it, and was clearly synovitis.

Case VI.—I attended an ox of one year old with a diseased pastern-joint; the joint had been affected, and under treatment also for some weeks before it came under my care. I found the disease in a fore extremity; the joint was very much swollen all round, and very tender on pressure, but not very hot. I had it blistered with a blister very extensively and severely; and, as the animal could make little or no use of it, he was kept very quiet. I had the pastern fired with a hot iron in the usual manner, &c., and blistered again. In about six months he was quite well, that is, free from active disease, but the joint remained large and stiff: the long disease kept him much behind; when the other cattle, same quality and age, were sold at £18 a-head, this one brought only £11.

It was not known to any one whether this ox got any hurt or not; the case appeared to me, however, as being the result of a sprain, but may have been *synovitis*. In cattle it is very difficult sometimes, *nay often*, to find out if there has been any injury sustained or not. Cattle are so much alone, you find one lame, and if there is no laceration, puncture, or contusion apparent, then you say it is *natural*—whereas it may be a sprain or bruise with no externally apparent symptom.

Case VII.—I was called to visit a lame beast; I found him with a great enlargement immediately between the stifle-joint and the hock-joint, inside the leg, but more closely attached to the former joint. It was very tender, hot, and a little, but very dull, fluctuation could be felt. I had it repeatedly bathed with warm water, and in three days the abscess was ripe for opening; afraid of its having a communication with the cavity of the stifle-joint, I opened it at the very lowest possible point, which was close to the hock-joint; a great quantity of pus escaped. Next day the synovia of the stifle-joint was perceptible in the discharge, the cavity of the abscess having communication with the stifle-joint: two days after, the synovia came freely and almost pure; I pinned up the wound, putting a large quantity of *tow* on the pin. The synovia collected in the large cavity formed by the abscess, and ultimately burst out afresh; I passed a long needle through the lips of the wound, put on a large quantity of *tow*, and blistered the whole part that had been occupied underneath by the abscess, and also for a considerable way around, with a blister; I did so, expecting that *adhesion* would be produced, and so confine the synovia to the cavity of the joint. The synovia collected still, however; the stifle-joint was a little affected at this stage, *synovitis* supervened, and I blistered again with no better result. After the blistered surface was whole, I made a *pad* suited to the breadth of the place, and in length to reach from the wound to the stifle-joint; I took a soft and long bandage, and put round all the limb between the hock and stifle, firmly keeping the *pad* on the cavity—the track pursued by the synovia in its progress from the stifle-joint to the wound. This had the desired effect; the synovia was completely confined to the joint; complete adhesion took place of the entire base of the abscess with the detached skin, &c.; the synovia never again appearing. The joint is a good deal enlarged, and stiffish, but the animal has the complete use of the limb. In this case I gave no constitutional treatment, as the animal was sucking his mother, and always in good health.

Case VIII.—On the 8th March 1861 I was called to visit a two-year-old ox—a feeder; his left fore leg was much swollen about the knee, hot, and very tender, especially immediately at the joint.

I took a fair bleeding from the neck, gave him salts and oil as opening medicine, applied the cooling lotion, as in case No. IV., very frequently to the affected part, and in five days he was very much improved—tenderness gone, heat and inflammation subsided. In the course of a few days I was called to him again; he was said to have *foul* of the hind foot—same side—so bad that he could put no weight upon it. I soon found that there was nothing wrong with the foot, and discovered the cause of the lameness to be disease of the stifle-joint, which was tender, hot, enlarged, and stiff. I advised that the animal should be slaughtered, as he was in good condition for the butcher, and would very likely daily sink in weight. The butcher found matter, *pus*, in the affected joints, also in some other joints; and, what astonished him more, the fundus of the urinary bladder, in place of being rounded, as is commonly the case, terminated in a blunt point of half an inch, and that extended into a tapering tube until he lost sight of it amongst the neighbouring tissues; this bladder he preserved as a curiosity. It is needless to say that the tube now referred to was the *urachus*; but as some of my readers may not be professional, I will take the liberty to explain what the *urachus* is. In the lower animals, while in the *fœtal* state, the *urachus* is a ligamentary hollow tube that arises from the base of the urinary bladder, and in which the cavity of the bladder terminates; this tube conveys the urine from the fœtus to the allantoid membrane—an organ situated between the chorion and amnion, and receiving the fœtal urine up to the period of birth, when it (the urachus) generally disappears. In some cases I have known it remain for a considerable time after birth, the young animal for some time discharging the urine at the umbilicus, but this gradually disappearing as the animal got older, generally a few weeks after birth.

Here the butcher's discovery was certainly a very uncommon one, to find the urachus entire and *pervious* in an animal considerably more than two years old! I am not aware of there being any such thing on record; if there is, I have never met with it either in practice or any writing. The fact also that the animal was diseased in the joints, pus being deposited in several of them, makes it very probable that there was pus in this urachus; the butcher had never met with such a case, and he did not examine it very minutely, merely keeping it as a curiosity; he knew it was not common, but was not aware that it was so uncommon.

A clever veterinary surgeon,* and one who has had a good practice, stated to me that he had never examined the carcass of a young animal, *including foals*, that died or was killed for joint disease but had the *urachus* entire, and that in these cases of joint disease the urachus always contained a small quantity of pus.

* Mr G. Stewart, V. S., Rothiemay.

I examined the carcass of a foal that was shot for joint disease; it was about four months old, and certainly the urachus was apparently entire, but contained no pus. The subject is well worth investigation. What might assist in the obliteration of the urachus would be passing a ligature round the umbilical cord pretty close to the young animal, immediately after its birth, &c.

That the pus existing in the urachus might be taken up and deposited in joints in various parts of the body, is very likely to take place; of this, the absorption of pus and its deposition in *other parts* of the body, many instances might be adduced.

Case IX.—A farm overseer in my neighbourhood purchased eight two-year-olds from the West country; these cattle he thought not very healthy-looking, and he took some blood from the neck of each to make them thrive better; without fastening the wounds, he turned them when bled into the park. The days were rather cold and wet; the wounds on the necks of two of the cattle did not heal kindly, they gaped out, had inverted edges, &c.; very soon the whole side of the necks of the two became swollen and very painful; they could not eat. I was then called to visit them, and found their necks very much tumified and hard, with an ichorous discharge from the wounds, &c. One of the beasts being in fair condition, I desired its being slaughtered, as only the neck would be lost. The other beast was thin and not worth killing. Everything was done to save this animal that could be thought of; but after hanging about for six weeks, it was thought advisable to have it destroyed, as it had been perfectly unable to stand or walk for some time, the joints generally being hot, tumified, and extremely painful. A post-mortem examination showed every cavity about the various joints filled with pus: all the internal organs were in a perfectly healthy state.

I am of opinion that the diseased joints here were due to the absorption of pus from the inflamed and suppurating neck; and this absorbed pus being deposited in the joints, set up irritation, and the low hectic fever this constitutional irritation produced rendered the animal a hopeless subject.

Case X.—I attended a beast that had got a kick on the hock-joint, which was laid open. One week had elapsed after the injury before I saw it. The lameness was extreme; at every movement made by the animal, synovia in an unhealthy state flowed freely from a small opening that communicated with the interior of the joint. To sweeten the discharge, and correct the diseased state of the membrane inside, with a small syringe I repeatedly injected into the cavity of the joint "Beaufoy's chloride of soda," diluted with four parts of water; after this I closed the wound by applying to it the bichloride of mercury, using a light bandage for a

short time, and then blistering over the whole joints again and again with a blister. After the lapse of about two months it had the use of the leg; the joint was, however, somewhat stiffish and enlarged ever after.

Case XI.—Visited a grown beast that had got a kick from a horse on the shoulder: the olecranon was fractured or loosened, but not displaced; great tumifaction, with heat and tenderness of the injured parts, and inflammation about the joint. The animal could make no use of the limb, *none.* I took a good bleeding from the neck, gave a dose of opening medicine, and applied the cold lotion as in case No. IV. for ten days, when the animal made some use of the limb. I put on the following blister:—

No. I.	℞ Canthar. pulver., . .	ʒ iij.ss.
	Venice turpentine, . .	ʒ iij.ss.
	Lard, ...	℥ ij.
		Mix.

This was well rubbed in over the joint, with but little improvement. Repeated the blister, and still a good deal of lameness: applied an ointment of the bin-iodide of mercury, with a good deal of friction, composed of—

No. VII.	℞ Bin-Iodide, ...	ʒ j.
	Wax, ...	℥ j.
	Lard, ...	℥ vij.
		Mix.

This had the desired effect. After a few weeks the animal was quite sound, but a little thickening remained about the injured part.

Case XII.—I was called to an old calf, a strong beast, lame on one leg: the stifle joint enlarged, hot, and tender. Was pretty well in general health, but lean; applied the cold lotion of case No. IV. for one week, but no improvement; blistered over the joint with No. I. blister, Case XI., but no better; passed a seton, 9 inches long, over the joint on the outside, keeping it in operation with savine ointment; when, after some few months, it had the partial use of the limb; the joint thicker and stiffer than natural, but quite hearty to run after its fashion, and quite able to shift for its meat. This beast was too long without treatment; the first stage of the attack, *rheumatic*, was passed before I saw it.

Case XIII.—A cross cow, a strong young animal, six weeks after calving, was observed very stiff when out to the water, sometimes one and sometimes another limb would be stiffer than the others. Considerable constitutional irritation being present, blood was taken to the extent of four quarts or thereby, and some laxatives given, but the animal was no better. Particular parts of the animal, those apparently most affected, were rubbed with a

stimulating embrocation—spirits turpentine, with one-fourth part olive oil added—and still no improvement. The appetite failed, grinding of the teeth, &c., and the yield of milk became less; gave for one week the powders described in Case No. V., one every night in gruel, and still no improvement. The animal now lost the power of walking, and scarcely rose up at all; the joints became tender, hot, and enlarged; and, as she was in good condition, the owner sold her to a butcher. When slaughtered there was scarcely a joint (if any) in which there was not more or less of pus. I did not examine the membranes, as she was slaughtered some days before I was aware. This was clearly a case of rheumatism, terminating in inflamed joints, with a deposit of pus in them.

The following are some of the powders and lotions referred to in the foregoing section.

Stimulating Stomachic Powders.

No. V.	℞	Carb. am. pulv., . .	ʒ iij.
		Nitre pulv., . . .	ʒ jv.
		Ginger pulv., . . .	ʒ iij.
		Gentian pulv., . . .	ʒ jv.
		Aqua am., sp. gty. 880, fl.,	ʒ ij.
			Mix; one dose.

Tonic Powders.

No. VI.	℞	Ferri sulph. pulv., . .	ʒ iij.
		Gentian pulv., . . .	ʒ jv.
		Ginger pulv., . . .	ʒ ij.
		Carb. am., . . .	ʒ j.ss.
			Mix; one dose.

The White Lotion.

No. VIII.	℞	Zinci sulph., . . .	ʒ vj.
		Plumbi acet., . . .	℥ j.
		Spring water, . . .	℥ xx.
			Mix.

PREVENTION OF JOINT-ILL.

One of the first rules that a stockmaster should adopt is to make a good selection of animals, whether sheep or cattle; this may be depended on—that there are healthy and unhealthy flocks of sheep to seclect from, and there are healthy and unhealthy herds of cattle from which to select animals for breeding purposes; the best formed and best conditioned animals to look at may not be the most eligible to breed from—may not produce the most healthy stock.

Medical gentlemen tell us that they know strumous persons, even when in perfect health, by merely looking at them. I am not sufficiently versed in these matters to say how far this *is* or is not true; but I am not aware that any such power of diagnosis and prognosis is possessed by any stockmaster, experienced cattle-breeder, or veterinary surgeon; at any rate, I find such persons are as often deceived in the animals they purchase at sales, as are others of far less note as judges of cattle, sheep, &c.

There is one reliable source of information open to all purchasers of breeding-stock—acquire a knowledge of the antecedents of the stock from which he purposes to purchase: what percentage of such stock have died from, or been slaughtered for, disease within a given number of years back? With what diseases have they been affected? Have rheumatic or tubercular diseases appeared in the stock? and to what extent have they prevailed? Examine the premises on which they have been raised, and find out from observation and inquiry how they have been treated when young.

It is many years since an Englishman, in writing on the breeding of cattle, said, "All good stock must be bred with attention and well fed; it is necessary that these two essentials in this species of improvement should always accompany each other, for without resources of keeping it is vain to attempt raising a capital stock." Every purchaser of good cattle should value his own resources, for it is in the highest degree absurd to purchase high-bred, well-housed, well-fed cattle, and put them on a farm of poor soil, meagre keep, and filthy, ill-ventilated, or ill-drained tenements. It is also true that many bulls that are sold at high figures and from good stock, have been pushed by keep, &c., to the highest degree of fattening and growth—circumstances often becoming a source of weakness.

To physiologists it is a well-known fact that warm-blooded animals require, for the due support of life and proper development of the body, substances which are divided into two classes: the *nitrogenised* and the *non-nitrogenised;* the *former* of these the animal system converts into blood, the *latter* cannot be made to undergo this transformation; from the blood are formed all the organised tissues, *i.e.*, from the nitrogenised portion of the aliment. The other class of substances, non-nitrogenised, supports the process of respiration. The *first* are called the plastic elements of nutrition, the *second* the elements of respiration. Liebig's and others' chemical researches have shown that all the portions of vegetables that can afford nourishment to animals contain constituents which are rich in nitrogen; and ordinary experience shows us that animals require less of those plants for the due support and nutrition of their bodies, just in proportion as they abound in these nitrogenised elements; and it is well known that these important products are especially abundant in the seeds of our different kinds of grain, and of pease, beans, and lentils, and in the roots and juices of many of our agricultural vegetables.

Liebig, after referring to the nutritive powers of nitrogenised constituents, thus writes: "While the preceding considerations leave no doubt as to the way in which the growth, the increase of mass in an animal is carried on, there remains the question—

What is the function performed in the animal system by substances containing no nitrogen, such as sugar, starch, gum, pectine, &c.?" In order to enable us to answer this question truthfully and intelligently, we must glance at the element oxygen in some of its important relations to *life*. The observations of vegetable physiologists and the researches of chemists have mutually contributed to establish the fact, that the growth and development of vegetables depends on the *elimination* of oxygen. In contra-distinction to vegetable life, the life of animals exhibits itself in the continual *absorption* of the oxygen of the air, and its combination with certain component parts of the animal body or food. Oxygen is principally absorbed into the animal body by the lungs and skin; in the animal system it unites with the carbon contained in the food furnished to the animal, carbonic-acid is the result; and the union is distinguished also by the production of *heat*—the principal source of animal heat.

But, when animals are tied closely up, debarred from exercise, and the houses in which they are so kept are warm, and the animals are fed on substances containing sugar, starch, gum, pectine (these are rich in carbon), then, under these circumstances, there is a very small quantity of oxygen absorbed and much *carbon* supplied by the food. There is comparatively little of this carbon required for the production of heat in conducting the respiratory process, and all the remainder is employed in the production of a substance which, in the normal state, only occurs in small quantity as a constituent of the nerves and brain—this substance is *fat*.

The flesh of wild animals is, almost always, devoid of fat, while that of stall-fed animals is covered with it. When the fattened animal is allowed to move freely in the open air, or compelled to draw heavy burdens, the fat again disappears; it is thus plain, that the formation of fat in the animal system is the result of a want of a due proportion between the food taken into the stomach and the oxygen absorbed by the lungs and skin. A pig, when fed with highly-nitrogenised food, becomes full of flesh; when fed with non-nitrogenised food it acquires little flesh but a thick layer of fat. Fat is thus an abnormal deposit—certainly not compatible with the highest development of the animal system, and does not indicate a truly healthy and vigorous state of the animal body.*

What I now urge upon the notice of those raising cattle is this: bulls and heifers, when young, if intended for breeding purposes, should not be kept and treated after the manner of cattle fattening for the butcher, as is too commonly the case, but the *very reverse;*

* The reader should consult 'Professor Johnston's Agricultural Lectures,' and 'Mulder and Liebig on Vegetable and Animal Physiology,' &c.

food rich in nitrogen should be liberally supplied to them; the buildings they occupy should be perfectly ventilated; they should have ample scope for exercise, with no possibility of the air they breathe being contaminated;—these are the circumstances—the proper conditions—which will in general insure a stock of hardy, healthy, and prolific beasts. They may not be so very nice to look at as the extremely *fat* beasts are, but they will be found better and far surer property. Young bulls raised on the fattening principle are jolly beasts to look at, but, being very tender and delicate, are not in any way fit at their age to serve the large cows to which they are often turned out, consequently they injure themselves, are soon affected with joint-ill, or are otherwise perfectly useless for breeding purposes. Bulls of the shorthorn breed are, in general, put far too soon to serve cows; such a practice of making use of animals for breeding purposes prematurely, and before they have arrived at some degree of maturity, tends not only to reduce the breed in size, but destroys the *stamina* of that particular family, and renders them much more subject to scrofulous and rheumatic affections, with all their concomitant or resultant evils, such as tuberculosis, joint-ill, &c.

I would recommend that in the calf-byre each young calf should be allotted a space 6 feet square, not tied at all, and allowed to jump about at will. The divisions forming the calf-boxes should consist of narrow splits of wood, upright, with 3-inch openings between every two, are 4 feet high, and afford full scope to the circulation of pure air. I have had experience that the stock raised in these houses is admirably healthy.

Every grass field on which cattle are put to graze night and day should be accommodated with a perfect shelter from cold winds, rains, or excessive heats; this may easily be effected by raising temporary houses of wood; the stock occupying every inclosure should have free access to such houses. A house 30 feet long and 10 feet wide *inside*, would shelter some twenty cattle of two years old. These erections, being placed at the crossings of divisions or fences would, by a little contrivance, be available to more enclosures than one; and, where fairly tried, will be found of immense benefit to cattle during the extremes of cold or heat. It is not the amount of heat or cold in this temperate climate that does the injury to animals, &c., it is the transition from heat to cold, and *vice versa*, that is to be dreaded; and it has been found by experience that the transition from severe cold to excessive heat is the source of far more and greater evils to the animal system than is the transition from heat to cold. It is almost needless to say that every inclosure should be furnished with a full supply of good water, available at all times to its occupants. Attention to these generalities will go a great way towards preventing joint-ill and other affections of analogous character.

CONCLUDING REMARKS ON JOINT-ILL.

I have thus very briefly gone over some of the causes, "remote" and "proximate," that induce joint-ill or joint-disease, both directly and indirectly; I have given a few cases simply as they occurred to and were treated by me in my everyday practice; I have made a selection, from among many, of those cases which I considered would best illustrate the different phases of joint-ill; these illustrations include the treatment adopted by me, and its results. Affections induced by external injury are given, because I conceive the disease of the joint that followed the injury was as much owing to constitutional irritability, a tendency to strumous affections in the animal, &c., as to the direct effects of the injury; in other words, had the animals been in a perfectly sound and healthy condition, the injuries received might have passed off, in most cases, with little or no trouble. And I may say that, in all analogous cases that have occurred in my practice, I have adopted the same treatment as that now explained—of course modified by and adapted to the nature of the case, the size and age of the animal, &c.

I have given thirteen cases in illustration—three tubercular, four idiopathic synovitis, two of pus deposited in joints from other sources within the body, two the result of external accidents, and two cases following rheumatism. I have also pointed out some things that I conceive would, if adopted, tend to prevent the appearance of this most intractable malady.

In conclusion, I would say, if every veterinary surgeon would faithfully record and make public his own experience, and HIS OWN EXPERIENCE ONLY, then we might soon be in possession of reliable, extended, and useful statistics relating to health and disease in the lower animals.

I have already said that, in consequence of the onward march of intellectual enlightenment, the mass of general readers are better prepared for appreciating and profiting by the perusal of any professional disquisition than they were a few years back; they are also far better judges of the true value of the services of scientific men, whether that service be spent on the human or the brute. And whether we have the talent or the perseverance to investigate, detect, and demonstrate them or not, there cannot be a doubt but the animal system, *in health* and *under disease*, is regulated by laws as precise in their nature, as specific in their character and action, and as *demonstrable* even in their *profundity*, as are the laws that determine the motions of the beautiful orbs that sweep in silent majesty over our heads, or the no less wondrous ocean that rolls in grandeur "around our much-loved isle."

ON EXPERIMENTS WITH FOUR DIFFERENT VARIETIES OF OATS.

By WILLIAM WALKER, Ardunckart, Aberdeenshire.

[Premium—£15.]

THE farm where the experiment was conducted is all wrought on the six-course rotation; average elevation 650 feet; lies 33 miles inland. The field where the experiment was conducted slopes to the south, well sheltered from the north by a hill and grown-up plantation; ploughed up after lea in the autumn to the depth of 6 inches; extent, 16 imperial acres; soil, derived from a sandstone formation, a light brown-coloured loam about 12 inches deep, resting on a clay subsoil partially mixed with gravel and naturally dry. Four acres were measured off in the centre of the field, both equal in quality and condition, one acre allowed for each plot, and these separated by spaces 30 inches wide. The seed sown was all of crop 1860—of the stock that gained the first prizes in their respective classes at our local seed-show. The Scotch and English Birlie varieties I procured from respectable farmers in the neighbouring parish. The Kildrummy and Potato had been grown on the farm for years.

CROP 1861.

The different kinds were all sown with a drill-machine, 5 inches apart, on the 21st of March. Quantity of seed sown per acre:—

Plot 1. Kildrummy Oats,	3 bushels, $4\frac{1}{2}$ lb.;	weight per bushel,	44 lb.
... 2. Potato Oats,	3 bushels, 35 lb.;	„	42 lb.
... 3. Scotch Birlie Oats,	2 bushels, 37 lb.;	„	44 lb.
... 4. English Birlie Oats,	3 bushels, 34 lb.;	„	42 lb.

All the kinds showed braird on the 15th of April. Plots 2 and 4 looked thinner of plants than the other two.

May 15.—All looking quite healthy.

June 14.—Examined more particularly; find the thin plots alluded to now have made rapid progress in tillering: to all appearance will not be behind the others as to number of plants; all the plots have a fine healthy appearance: average length of stems, 12 inches.

June 20.—No. 1, looking well and thick on the ground; No. 2, still a little thinner but tillering well, and continues to retain a fine healthy dark-green colour. No. 3 seems thicker of plants than any of the others, notwithstanding it having less seed, but does not look so healthy. No. 4 was thinnest of plants at brairding, but is now fully as thick as any of the others. This variety has

shown the best tillering qualities; average length of stems, 15 inches.

June 26.—Examined by two members of the Highland Society, whose report is annexed, who also checked the measurement of the plots.

July 5.—Nos. 3 and 4 showed ear, but Nos. 1 and 2 not till 10th July.

July 18.—Nos. 3 and 4 full shot; average length of stems, 3 feet 6 inches; length of ears, 8 inches; ears of No. 4 fully as long, but scarcely so rich to appearance. Nos. 1 and 2 not full shot, and leaves still growing; ears about the same length in No. 1 as Nos. 3 and 4; No. 2 is about one inch shorter, but seems richer than any of the others.

July 31.—Examined by committee, whose report is annexed.

Aug. 6.—Nos. 1 and 2 full shot and filling well. The 3d of August was a perfect tempest of wind and rain, which partially laid all the plots, but not to any great extent.

Examined on the 15th—all the plots risen again; Nos. 3 and 4 ripening fast, and to all appearance will be both ready at same time: Nos. 1 and 2 about a week later.

Plots 3 and 4 all cut on the 10th of September.

Plots 1 and 2 cut on the 17th of September.

Plots 3 and 4 all carried, each carefully weighed on the steel-yard, and stacked by itself, 18th September.

Plots 1 and 2 underwent the same operations on the 30th September.

All thrashed (the machine carefully cleaned before testing each variety) between the 13th and 17th of January 1862. Grain dressed, measured, weighed, and in each case deducted from the gross weight of the crop.

The following Table shows the results:—

TABLE

TABLE SHOWING RESULT OF EXPERIMENT, CROP 1861.

	Gross weight per imperial acre as weighed from the field.			Quantity of dressed grain per acre.			Weight per bushel.	Price per quarter of 40 lb. per bushel.	Market value of dressed grain per acre.			Light oats per acre.		Weight per bushel.	Value per acre.		Weight of straw per acre.			Rate per cwt.		Value of straw per acre.			Total value per acre.		
	CWT.	QR.	LB.	QR.	B.	LB.	LB.	S.	£	S.	D.	B.	LB.	LB.	S.	D.	CWT.	QR.	LB.	S.	D.	£	S.	D.	£	S.	D.
PLOT No. 1. Kildrummy Oats, .	52	2	0	5	5	21	41	20/	5	18	11¾	2	27½	31	3	10	35	0	15	1	6	2	12	8¼	8	15	6
PLOT No. 2. Potato Oats, . . .	46	1	0	5	4	4	41½	20/	5	18	5	1	12	18	1	3	29	2	16	1	6	2	4	5½	8	4	1½
PLOT No. 3. Scotch Birlie Oats,	47	1	13	4	7	31	42	20/	5	9	2	2	23	32½	3	8	32	0	22	1	6	2	8	3½	8	1	1½
PLOT No. 4. English Birlie Oats,	51	0	15	5	6	25	42	20/	6	8	0	2	0	30½	2	6½	23	0	13	1	6	2	9	8	9	0	2½

Experiment on Crop 1862.

The field where this experiment was conducted contains 11 acres very good yellow outfield land; soil from 8 to 10 inches deep, resting on an open subsoil inclining to clay, and naturally dry; well sheltered from the north and west by hills and grown-up plantations; broken up from lea in the month of February, and the depth of furrow 6 inches. Four acres were measured off in the centre of the field, of equal quality and condition, divided into plots of an acre each, by spaces 2 feet wide all round. The oats were all sown on the 5th of April with a drill-machine 5 inches apart. Seed of this and last year's experiment deposited at a depth of from 1 to 2 inches.

The seed sown was of the produce of the crops in last year's experiment, and the quantities per acre were as below:—

Plot 1. English Birlie Oats,	3 bushels, 26 lb.;	weight per bushel,	43 lb.
... 2. Scotch Birlie Oats,	3 bushels, 18 lb.;	„	42½ lb.
... 3. Potato Oats,	3 bushels, 21 lb.;	„	44 lb.
... 4. Kildrummy Oats,	3 bushels, 1 lb.;	„	42½ lb.

All the varieties showed braird on the 25th April, and looked well and very equal. Plots 3 and 4 looked rather thinner of plants.

Examined May 28.—No marked difference in any of the plots, except 3 and 4, which seemed still a little thinner of plants.

June 10.—All looking well; Nos. 3 and 4 plots much improved. The grub seems to be working a little on these two plots, but scarcely more than visible.

Examined June 20.—Find the grub has done no farther damage since last examination was made, and the plants are still making great progress in tillering—all the plots showing a fine healthy appearance.

Examined by two members of the Highland Society, on June 26, whose report is given.

July 21.—Plots 1 and 2 showing ear.

Aug. 4.—Plots 3 and 4 showing ear.

Aug. 9.—Nos. 1 and 2 fully shot, and commenced to fill. Scarcely any difference between either.

Aug. 19.—Plots 3 and 4 fully shot, and commenced to fill. Except the difference in the time of shooting of the different plots mentioned, there was nothing else worth recording.

Aug. 30.—Examined by members of Highland Society.

Sept. 25.—Plot No. 1, English Birlie, is within about four days of ripening: length of ear, 8 inches.

Sept. 25.—Plot 2 (Scotch Birlie) is nearly ripe: length of ear, 9 inches. Plots 3 and 4 are also nearly ripe: length of ear, 8 inches. In the latter plot, the length of ear, 9½ inches.

Sept. 29.—Examined, and find No. 1 is now full.

Plots 1, 2, and 3, reaped 1st October; plot No. 4, 7th October.

The three first-mentioned plots all carried, weighed, and stacked on 9th October, and plot No. 4 on 17th October.

All the plots thrashed, grain dressed, measured, weighed, between the 13th and 20th of same month, and in each case deducted from the gross produce.

The following Table shows the results:—

TABLE

TABLE SHOWING RESULT OF EXPERIMENT, CROP 1862.

	Gross weight per imperial acre, as weighed from the field.			Quantity of dressed grain per acre.			Weight per bushel.	Price per quarter of 40 lb. per bushel.	Market value of dressed grain per acre.			Light oats per acre.		Weight per bushel.	Value per acre.		Weight of straw per acre.			Rate per cwt.		Value of straw per acre.			Total value per acre.		
	CWT.	QR.	LB.	QR.	B.	LB.	LB.	S.	£	S.	D.	B.	LB.	LB.	S.	D.	CWT.	QR.	LB.	S.	D.	£	S.	D.	£	S.	D.
PLOT NO. 1. English Birlie Oats,	45	3	0	4	5	12	42½	21/	5	9	7¾	3	0	25	1	10½	32	2	9	1	6	2	8	11½	8	0	4¾
PLOT NO. 2. Scotch Birlie Oats,	51	3	14	5	0	7	41½	21/	5	12	11	3	17	33½	5	11¾	35	3	22	1	6	2	13	10½	8	6	0¼
PLOT NO. 3. Potato Oats, ...	49	2	14	5	1	0	40½	21/	5	10	2¼	3	0	25	1	10½	34	0	15	1	6	2	12	2¼	8	4	3
PLOT NO. 4. Kildrummy Oats, .	53	2	0	5	3	28	40½	21/	5	17	5½	2	0	24	1	0	36	2	9	1	6	2	15	0	8	13	5½

The regulations given out by the Highland and Agricultural Society of Scotland for conducting this experiment have been strictly observed in every particular; the most particular operations were done with my own hand. I do not think it would have added much to the value of the experiment to have done it in duplicate, as it is rather a difficult matter to get four acres equal in quality and condition. It would be almost, at any rate in this locality, impossible to get eight acres in one field equal. I have preferred making these experiments on the best outfield land I had, in order to be less liable to lodge. For my own part I feel a difficulty in ascertaining the merits of the different varieties from the many causes affecting the results, the most powerful of which is the nature of the season—the one variety giving the best return in one season, and proving deficient in the next. The Kildrummy oat, which is a late variety and suitable for a late district, has produced most value, taking the good and bad seasons together. For heavy land in late districts I prefer the Scotch Birlie oat for land broken up from lea, and the English Birlie for land after turnips. Some people prefer the Sandy oat for land after turnips, and I have seen it in some cases answer very well; but in a late district I think the English Birlie more suitable, as it is, in my experience a good deal earlier, which is of course of great consequence, especially in a season like the present.

EXPERIMENTS on DIFFERENT VARIETIES of OATS on the FARM of ARDUNCKART, by Mr WILLIAM WALKER, Tenant of the Farm.—*Crop* 1861.

ARDUNCKART, BY MOSSAT, ABERDEENSHIRE.

We, Peter Reid, farmer, Nether Kildrummy, by Mossat, and James Porter, land-steward at Monymusk, both members of the Highland and Agricultural Society of Scotland, in terms of instructions given us by Mr Hall Maxwell, Secretary of the Society, have carefully inspected said experiments on the farm of Ardunckart, and have to report as follows, viz.:—

First Inspection, 27th June 1861.

1. The soil is composed of a red loam about 12 inches deep, resting on a soft subsoil of yellow clay, partially intermixed with gravel. The experiments have been made in the centre of a large field sloping to the south, and the soil appears to be particularly uniform both in quality and condition.

2. The experimental plots are four in number, and the names of the different varieties of oats sown on them are, 1st, Kildrummy Oats; 2d, Potato Oats; 3d, Scotch Birlie Oats; 4th, English Birlie Oats.

3. One acre of land has been set apart for each plot, and we have checked the measurements and found them to be correct.

4. The plots all around have been carefully separated by clear spaces of fully 30 inches wide.

5. The seeds have been very systematically sown in drills 5 inches apart.

COMPARATIVE APPEARANCE AND PROGRESS OF EACH CROP.

Plot 1 looks healthy and close on the ground; stems about 18 inches long.

Plot 2 appears somewhat thinner of plants than Plot 1, but the stems are darker in colour, and the leaves a good deal broader than on any of the other plots.

Plot 3 looks fully closer in plants than any of the others, but scarcely so luxuriant and dark in the colour as the last plot.

Plot 4 is nearly similar in colour and in thickness of plants to No. 1.

The present appearance of the crops on all the plots is good—fully equal to the average on the best fields in the country.

Second Inspection, 31*st July* 1861.

Plot 1. Not yet fully shot; still in a growing state; average length, 3½ feet of stem; leaves not begun to fall down.

Plot 2. Still growing; average length of stalks 3 feet 3 inches; ears not quite so large as in any of the other plots.

Plot 3. About 3 feet 6 inches long in the stems; farther advanced by about a week than any of the other plots; ears large, and grain filling fast.

Plot 4. Grain fully shot; average length of stem, fully 4 feet, and the general appearance of the crop is rather the best on the field.

None of the plots have been in the least laid down by the late rains, nor are they likely to be so this year.

The land in question appears to have been previously well cultivated, and it is perfectly free from weeds; and looking at the clayey nature of the soil, and the excellent exposure of the farm, we would consider it specially adapted for the growth of *clean, good* grain. The experimental plots are of a fine size, and not too numerous, as is often the case; and they will, therefore, be the more easily kept correct. The rules of the Society, so far as we can see, have been most strictly complied with; and should the experiments be carried out in the same regular and careful way in which they have been begun, we should think them well calculated to afford reliable information on the subject for which they have been instituted.

PETER REID.
JAMES PORTER.

31*st July* 1861.

REPORT on EXPERIMENTS on OATS, on the FARM of ARDUNCKART, now being carried out by Mr WILLIAM WALKER, Tenant of the Farm.

ARDUNCKART, BY MOSSAT, ABERDEENSHIRE.

We, Peter Reid, farmer, Nether Kildrummy, and James Porter, land-steward, Monymusk, both members of the Highland and Agricultural Society of Scotland, having been appointed by Mr Hall Maxwell, Secretary of the Society, to inspect said experiments, which we have carefully done, and have to report thereon as follows:—

First Inspection, 26th June 1862.

1. The soil on which the experiments are being carried out is quite uniform in quality and condition. It is good yellow outfield soil, from 8 to 9 inches deep, on an open red subsoil, and on a sandstone formation. It has the advantages of a good climate and an excellent exposure; the field slopes gently to the south-east, and it is well sheltered from the north and west by hills and grown-up plantations.

2. One acre of land has been allowed for each variety of oats, and we have measured the different plots and found the measurements correct. The lots have been separated by clear spaces of fully 2 feet wide, and they have been hoed and kept clear of weeds during the season.

3. The oats have been systematically sown in drills of 5 inches apart, and the seed appears to have been evenly distributed over the ground. The varieties used are four in number, as notified below:—

Plot 1. *English Birlie Oats.*—This plot looks quite healthy and close, and the stems are from 10 to 12 inches long.

Plot 2. *Scotch Birlie Oats.*—The appearance of this plot is very similar to the last one, only that the stalks average fully 12 inches long.

Plot 3. *Potato Oats.*—The plants on this plot are rather thinner than on the last two. The stems are fully 12 inches long, with a profusion of broad dark-green leaves.

Plot 4. *Kildrummy Oats.*—A small portion of this plot has been slightly eaten by the grub, otherwise it is fully as close on the ground as any of the others, and the stems generally about the same length.

Second Inspection, 30th August 1862.

Plot 1. *English Birlie Oats.*—The crop on this plot is well filled, and beginning to take on the harvest hue. It is about a week in advance of any of the other plots, and with ordinary good weather it should be ready for harvesting in less than three weeks.

Plot 2. *Scotch Birlie Oats.*—This plot appears to be rather the best on the ground. The ears are large and well formed, and the grain is nearly full, and we should think it would be ready for harvesting in about four weeks hence. The average length of the stems is 3 feet 10 inches, and Plot 1 is about the same length.

Plot 3. *Potato Oats.*—The stalks on this plot are fully 4 feet long, but they are thinner on the ground than on any of the other plots. The leaves are green and not much fallen down, and the grain is not yet properly filled. It will likely be about five weeks hence before it be ready for the scythe.

Plot 4. *Kildrummy Oats.*—The grain on this plot is in the same stage of ripeness as that on the last plot. The stems are quite close on the ground, and about the same length as those in Plot 3. The spots eaten by the grub have filled up well, and the crop does not appear to have suffered any damage in consequence of the thinning.

Some time ago Mr Walker submitted to us the propriety of having the plots done in duplicate. Our opinion as to this is, that they are much better when done single; for in this hilly and uneven surfaced country it would often be difficult to get eight or ten acres of land in the centre of a field of equal quality, when one-half the quantity would readily be got of uniform description. Although samples of the seed will be laid before the Society, we may hear mention that the grain on all the plots looks clean and true to its kind, and free from all admixture of any other sorts.

PETER REID.

JAMES PORTER.

30th August 1862.

PROCEEDINGS IN THE EDINBURGH VETERINARY COLLEGE.

By Professor DICK.

SUMMARY OF CASES, comprising DISEASES, INJURIES, &c., amongst DOMESTICATED ANIMALS, registered in the CLINICAL TRANSACTIONS of the EDINBURGH VETERINARY COLLEGE, which have been under treatment during the months of October, November, and December, 1862.

	Horses.	Cattle and Sheep.	Dogs, Pigs, &c.
Abscesses in various parts,	8	...	1
Apthæ epizooticæ (murrain),	...	11	...
Bones, fractures and injuries of,	7	...	1
Broken knees,	2	...	...
Bruised heels,	14	...	...
Bursæ, distension of, with lameness,	2	...	...
Cataract,	1	...	...
Catarrh and sore throat,	62	...	...
Castration,	...	...	1
Choking,	1	...	...
Chorea,	...	...	1
Colic,	25	...	...
Colon, rupture of,	1	...	...
Constipation (obstinate),	2	...	...
Cornea, opacity of,	1	...	3
Cow-pox,	...	5	...
Cracked heels,	3	...	...
Curb, with lameness,	7	...	...
Diabetes (Polyuria),	5	...	...
Debility (constitutional),	1	...	1
Diarrhœa,	2	...	...
Distemper,	...	...	9
Docking,	1	...	1
Dysentery,	...	1	...
Ear, canker of,	...	...	1
Enteritis,	2	...	...
Examinations as to soundness,	42	...	...
„ „ pregnancy,	1	...	...
Feet, wounds and bruises of,	16	...	...
„ canker in,	1	...	...
„ corns in, with lameness,	2	...	...
„ inflammation in (Laminitis),	5	...	...
„ pricks in, from nails,	24	...	...
„ quittors in,	2	...	...
„ navicular disease in,	30	...	...
„ sandcracks in,	4	...	...
„ side-bones, with lameness,	3	...	...
„ thrushes in,	1	...	...
Fistula and ulcers,	3	...	...
Frost-bites (legs),	6	...	...
Grease,	4	...	...

	Horses.	Cattle and Sheep.	Dogs, Pigs, &c.
Gonorrhœa,	...	...	1
Heart, diseases of,	2	...	...
Hœmoptysis,	1	...	...
Hysteria,	1	...	...
Indigestion,	3	1	...
Influenza,	32	...	...
Joints, injuries to, from blows,	6	...	...
Lameness, elbow-joint,	1	...	...
" coffin, "	1	...	...
" fetlock, "	6	...	...
" hip,	7	...	...
" hock,	3	...	...
" knee,	2	...	...
" shoulder,	2	...	...
" stifle,	5	...	...
Mange,	10	...	6
Melanosis,	1	...	...
Opthalmia (specific),	1	...	...
Paralysis,	...	1	1
Pleurisy and bronchitis,	2	...	...
Pleuro-pneumonia,	...	3	...
Quidding,	1	...	...
Rheumatism,	1	1	...
Ringbones, with lameness,	5	...	...
Roaring and thick wind,	4	...	...
Swelled legs,	1	...	...
" sheath,	1	...	...
Spavin, with lameness,	6	...	...
Splints,	1	...	...
Sore back, from saddle,	1	...	...
Staggers,	1	...	...
Stomach, distension of (hoven),	...	1	...
Speedy cuts,	4	...	...
Strangles,	5	...	...
Stringhalt,	2	...	...
Sprains, tendons, and ligaments,	13	...	...
" muscles,	2	...	...
Tail, injury of,	1	...	...
Teats, injuries of,	...	2	...
Teeth, diseases of,	7	...	...
Thoropins,	3	...	...
Treads and overreaches,	3	...	...
Tumours, various,	2	...	1
Uterus, eversion of,	...	1	...
Weed,	13	...	...
Worms, intestinal,	1	...	2
Wounds and bruises other than feet,	28	...	...

GENERAL ABSTRACT.

Cases amongst horses,	483
" " cattle and sheep,	27
" " dogs, pigs, &c.	30
	540

The coincidence is somewhat remarkable that cow-pox, which, generally speaking, is a very rare disease in the bovine tribe, should have made its appearance in certain dairies, since the date of last report, at the same time that small-pox in the human race should have raged as an epidemic in various localities. Two of the students attending the classes, as well as two of my workmen, have been affected with the latter in a severe form. Both of the students and one of the workmen have recovered, but the other workman is still confined with the disease. From murrain and cow-pox prevailing among animals at the same time with small-pox in man, and all these being constitutional diseases, the most prominent symptoms appearing in an affection of the skin, it would seem that the atmospherical constitution of the season during which they have simultaneously occurred, must have exerted a considerable influence on their origin and progressive development.

The case of hysteria occurred in a mare seven years old. She was brought to the yard for examination and dissection. The mare, the property of a farmer, had been more or less affected for four years. Every time she was put into harness, either in the plough or harrows, and worked for a quarter of an hour, she became excited, was seized with a shivering fit, dropped suddenly down, rolled about, and in a short time recovered and rose to her feet. On getting the same amount of work she was again affected in a similar manner. This having continued so long, with no hopes of recovery, the owner determined to have her destroyed. This was done by opening the carotid artery, and after death a careful examination was made. The only morbid lesions that could be detected were a vesicular enlargement of one ovary, and a chronic inflammation and thickening of the mucous membrane of the uterus, the passage into it allowing of the introduction of two fingers. On the first appearance of the disease the owner was advised to put her to a horse, which was done, and she bore a foal, which she nursed. The disease, however, still continued, and the paroxysms appeared to be uninfluenced by the lactary secretion. After the first foal, although frequently in season and stinted, she never held.

On looking over the list, the most notable fact is the large proportion of injuries of the feet occurring in horses. During the three months no fewer than twenty-four horses were brought to the yard lame from pricks in shoeing. This may in some measure be accounted for, that in November, in consequence of the sudden changes from fresh to frost, as a matter of course the shoes of a greater than usual number of horses required to be removed for roughing or sharpening. On the appearance of a hard winter morning it is the usual custom, from mere local convenience, for parties having horses to frost to rush to the nearest smithy, temporarily giving up the one they are in the habit of shoeing at, and the consequence is, the smith, partly from being hurried, and partly from

want of previous knowledge of the foot of the horse, either drives the nails in to the quick, or too closely and injuriously upon it, the effect of which is to cause inflammation and suppuration in the injured part, and subsequent lameness.

Amongst the cases of sprains recorded, the only ones worthy of note are those of the muscles, in both cases the psoæ muscles being the ones injured. The common cause of this injury, as in these cases, is—the animal, when dragging a load up an ascent during frost, slips with its hind feet, and, in struggling to recover itself, strains, and frequently even ruptures, these muscles. The symptoms somewhat resemble those of paralysis of the hind quarters, in both cases the animal being unable to rise. Sprain of these muscles can, however, easily be distinguished from paralysis, inasmuch as in the former lesion, the animal, although unable to rise, still retains the use of its legs, and also of its tail, the parts likewise preserving their sensibility. In paralysis the parts have not only lost motion, but also feeling, which can easily be proved by pricking the parts with a pin. Again, in sprain, by introducing the hand into the rectum, the parts may be felt hot, swollen, and painful.

Swelling and excoriation of the legs, followed by desquamation of the hair, painful cracks of the heels and grease, began to make their appearance towards the end of December. Many of these cases proved very troublesome, causing considerable irritation and sometimes sloughing. Indeed, in one case, sloughing of the skin of both fore legs, extending upwards from the knees, set up so great amount of irritation that death was the consequence. The cause of these excoriations is to be traced to the long-continued wetness and coldness of the season, aggravated no doubt by occasional carelessness of the groom, who, after washing the feet and legs, allows the parts to dry of themselves without the necessary aid of salutary friction, or the application of bandages. In one or two cases the hair on the lower surface of the belly has been thrown off, attended with a degree of anasarcous swelling of the sheath and other dependent parts. A liniment composed of 4 oz. of rapeseed oil, and 1 oz. of Goulard's extract of lead, seemed to be the best application to rub into the parts once or twice a-day.

Although a great number of cases of catarrh, sore throat, and influenza have occurred during the three months, they have generally been mild and recovered favourably, so that the past season has been on the whole more healthy than might have been expected from the roughness and inclemency of the weather.

The case of eversion of the uterus occurred in a cow, the property of a gentleman in the neighbourhood of the city. Being otherwise engaged, I requested my assistant, Mr Strangeways, to attend to the case. Accompanied by two of the students, he proceeded to the byre; and his report of the case is as follows. On his arrival

he found the whole of the uterus everted and protruded through the vulva, the viscus very much inflamed, and the adjacent parts much swollen. On inquiring of the man in charge, he learned that the cow had been in milk for several months—a remarkable fact, as in the majority of cases this accident occurs almost immediately after parturition; that the day previous he thought the cow was a "bulling," she straining and bellowing. He added, that on going into the byre that morning about 6 o'clock, he found her in the state she was then in at mid-day; and that a farrier had been sent for, who had made long and ineffectual efforts to return it, but had given it up as a bad job. Mr S., before proceeding to replace the parts, administered 3 oz. of laudanum, partly to quiet the animal, and partly to relax the muscular fibres of the neck of the uterus. The next thing done was to get a stout cart-rope and pass it round the body, giving the ends to two assistants, with orders to tighten it at every strain made by the animal. These arrangements made, the next proceeding was to get the uterus well washed with tepid water so as to remove all dirt. In the mean time she got down, which still further pressed out the uterus. Finding it impossible to get her up, he had her hind-quarters packed up with straw, the ropes tightened, when he commenced the difficult task of returning the viscus. This was done by holding it up with a wet cloth, and with one hand at the neck, compressing it slightly, and with the other doubled, making continued pressure at the fundus, the organ was returned, the animal straining violently—so much so that it was necessary to retain the hand within the cavity for some time, the assistants all the while keeping the rope tight. On the straining somewhat ceasing, the uterus was spread out in its right place with the still clenched hand. On removing the hand a truss was applied against the vulva. The rope was tied tightly round the body; to this on each side were brought bands from the truss. A second rope was next tied round the animal's neck, to which the body-rope was fastened by three cords, one below the brisket, the others, one on each side of the shoulder. All being properly adjusted, the animal appearing quiet, she was left with orders to the man that after her rising, if necessary, the several ropes were to be tightened. On calling the next day, all was found right, and she continued to improve daily and do well. To allay any inflammatory symptoms, a dose of saltpetre and salts was administered, the latter tending to prevent also the constipating effects of the laudanum.

PREMIUMS AWARDED BY THE SOCIETY IN 1862.

NOTE.—The awards at the Battersea Show, having already been published, are excluded.

REPORTS.

1. L.15 to John Dove, Eccles Newton, Coldstream, for a Report on the effects of special manures over a rotation.
2. L.15 to William Walker, Ardunckart, Mossat, Aberdeenshire, for a Report of experiments with different kinds of oats.
3. The gold medal to Robert Scot Skirving, Campton, Drem, East-Lothian, for a Report on fish-offal as a manure.
4. The gold medal to James M'Gillivary, V. S., Rayne, Insch, Aberdeenshire, for a Report on weed in horses.
5. The gold medal to William Robertson, Erray, Tobermory, for a Report on braxy in sheep.
6. The gold medal to C. Y. Michie, forester, Duthill, Carrbridge, for a Report on the formation and management of young plantations.
7. The gold medal to Robert Hutchison of Carlowrie, Kirkliston, for a Report on recently introduced coniferæ.
8. The medium gold medal to John Stevenson, Garallan, Cumnock, for a Report on the cultivation of the carrot.
9. The medium gold medal to John Morrison, Coney Park Nurseries, Stirling, for a Report on pruning forest trees.
10. The medium gold medal to C. Y. Michie, forester, Carrbridge, for a Report on the diseases of forest trees.
11. The medium gold medal to John Grigor, Forres Nurseries, Forres, for a Report on the varieties of larch cultivated in Great Britain.
12. The silver medal to John Morrison, Coney Park Nurseries, Stirling, for a Report on the disease of the larch.
13. The silver medal to J. B. Webster, forester, Verner's Bridge, Moy, Ireland, for a Report on the diseases of forest trees.

DISTRICT COMPETITIONS.

CATTLE.

The District of the Border Union Society.

BULLS.	David Broadwood, Crowhill, Dunbar,	Silver Medal.			
BULLS, Class I.*	1. Andrew Haddon, Honeyburn, Hawick,		L.4	0	0‡
	2. Nicol Milne, Dryhope, Melrose, . .		2	0	0‡
BULLS, Class II.†	Thomas Simson, Blainslie, Lauder, .		5	0	0

The County of Elgin.

BULLS.	Sir George Macpherson Grant, Bart., .	Silver Medal			
BULLS, Class I.	1. John Collie, Ardgay, Forres, . .		L.8	0	0
	2. Robert Anderson, Kildrummie, Nairn, .		4	0	0
BULLS, Class II.	John Simpson, Cowfords, Fochabers, .		5	0	0
HEIFERS.	1. Alexander Paterson, Mulben, Keith, .		5	0	0
	2. Alexander Paterson, Mulben, Keith, .		3	0	0

The District of the Auchterarder Society.

BULLS.	Viscount Strathallan, Strathallan Castle,	Silver Medal.			
BULLS, Class I.	1. William Gardiner, Lowbank, Auchterarder,		L.4	0	0‡
	2. William Cameron, Millhill, Auchterarder,		2	0	0‡
BULLS, Class II.	William Cameron, Millhill, Auchterarder,		2	10	0‡

* Class I., Bulls calved before 1st January 1860.
† Class II., Bulls calved after 1st January 1860.
‡ Half Premiums awarded, the number of lots being under six.

The District of the Perth, Fife, Kinross, and Clackmannan Association.

BULLS.	William Stirling of Keir, M.P., Dunblane,	Silver Medal.			
BULLS, Class I.	1. A. & A. Mitchell, Alloa Mills, Alloa, .	L.8	0	0	
	2. George Robertson Barclay of Keavil, Dunfermline, ...	4	0	0	
BULLS, Class II.	James Gulland, Newton of Wemyss, Kirkcaldy,	5	0	0	
HEIFERS.	1. A. & A. Mitchell, Alloa Mills, Alloa, .	2	10	0*	
	2. A. & A. Mitchell, Alloa Mills, Alloa, .	1	10	0*	

The District of the Spey, Avon, and Fiddochside Society.

BULLS, Class I.	1. James Petrie, Glencony, Mortlach, . .	L.4	0	0*
	2. James Kelman, Lettach, Mortlach, .	2	0	0*
BULLS, Class II.	William Cantlie, Keithmore, Mortlach, .	5	0	0
HEIFERS.	1. Alexander Paterson, Mulben, Keith, . .	5	0	0
	2. William Robertson, Burnside, Craigellachie,	3	0	0

The District of Cowal.

BULLS, Class I.	1. Donald Gillies, Auchdaheran Mohr, Cairndow,	L.4	0	0*
	2. Archibald Clark, Inverchapel, Kilmun, .	2	0	0*
BULLS, Class II.	Ninian Duncan, Coleven, Rothesay, .	5	0	0
HEIFERS.	1. William Laing, Achafour, Innellan, .	5	0	0
	2. Thomas Lochhead, jun., Gortan Nausaig, Dunoon, ...	3	0	0

The District of the Royal Northern Society.

BULLS.	Robert Walker, Portlethen, Aberdeen, .	Silver Medal.		
BULLS, Class I.	1. Alexander Ronaldson, Littlegight, Methlic,	L.8	0	0
	2. Thomas Wishart, Cairntradlyn, Blackburn,	4	0	0
BULLS, Class II.	Silvester Campbell, Kinellar, Blackburn,	5	0	0
HEIFERS.	1. William M'Combie, Tillyfour, Aberdeen,	5	0	0
	2. William M'Combie of Easter Skene, Skene,	3	0	0

The District of the Deeside Association.

BULLS.	Sir James H. Burnett of Leys, Bart., .	Silver Medal.		
BULLS, Class I.	1. John Ross, Nether Park, Drumoak, .	L.8	0	0
	2. William Smith, Letterbeg, Strachan, .	4	0	0
BULLS, Class II.	James C. Thom, Quithillhead, Durris, .	5	0	0
HEIFERS.	1. John Hunter, New Banchory, Banchory,	5	0	0
	2. Robert Salmond, Nether Balfour, Durris,	3	0	0

DRAUGHT-HORSES.

The District of the Perth, Fife, Kinross, and Clackmannan Association.

STALLIONS.	Andrew Logan, Crossflat, Kilbarchan, .	L.25	0	0
MARES.	William Stirling of Keir, M.P., Dunblane, .	10	0	0
FILLIES.	William Stirling of Keir, M.P., Dunblane, .	5	0	0

The Stewartry of Kirkcudbright.

STALLIONS.	William Kerr, Lochend, Kilbirnie, . .	L.25	0	0
MARES.	Patrick Gifford, Ingliston, Twynholm, .	10	0	0
FILLIES.	John Muir, Lochfergus, Kirkcudbright, .	5	0	0

The District of Machars, in Wigtownshire.

STALLIONS.	John Frazer, Overton, New Abbey, . .	L.25	0	0
MARES.	Samuel M'Culloch, Skaith, Newton-Stewart,	10	0	0
FILLIES.	Charles Anderson, Barsalloch, Port-William,	5	0	0

* Half Premiums awarded, the number of lots being under six.

ENTIRE COLTS.

The County of Stirling.

Two-Year-Old Colts.	Peter Crawford, Dumgoyack, Strathblane,	L.6 0 0
One-Year-Old Colts.	J. S. Jack, Carrat, Stirling,	4 0 0

The Island of Bute.

One-Year-Old Colts.	John Lamont, Stuck, Rothesay,	L.4 0 0

The County of Kincardine.

Two-Year-Old Colts.	William Scott, North Leys, Banchory,	L.6 0 0

The District of Rhins, in Wigtownshire, for 1861.

Two-Year-Old Colts.	Col. M'Dowall of Logan, Stranraer,	L.6 0 0
One-Year-Old Colts.	Peter Blain, Innermessan, Stranraer,	4 0 0

The District of Rhins, in Wigtownshire.

One-Year-Old Colts.	W. W. Dorman, Deer Park, Stranraer,	L.4 0 0

LEICESTER SHEEP.

The County of Forfar.

Tups.	Robert Arklay of Eathiebeaton, Dundee,	Silver Medal.
Tups.	William Goodlet, Bolshan, Friockheim,	L.2 10 0*
Shearling Tups.	Robert Arklay of Eathiebeaton, Dundee,	2 10 0*
Ewes.	Robert Arklay of Eathiebeaton, Dundee,	2 10 0*
Shearling Ewes.	William Goodlet, Bolshan, Friockheim,	2 0 0*

The District of the Perth, Fife, Kinross, and Clackmannan Association.

Tups.	Lord Kinnaird, Rossie Priory, Inchture,	Silver Medal.
Tups.	David Wallace, Balgrummo, Leven,	L.5 0 0
Shearling Tups.	David Wallace, Balgrummo, Leven,	2 10 0*
Shearling Ewes.	David Wallace, Balgrummo, Leven,	2 0 0*

The County of Haddington.

Tups.	David Ainslie of Costerton, Blackshiels,	Silver Medal.
Tups.	William Purves, Linton Burnfoot, Kelso,	L.2 10 0*
Shearling Tups.	George Simson, Courthill, Kelso,	5 0 0
Ewes.	George Simson, Courthill, Kelso,	2 10 0*
Shearling Ewes.	George Simson, Courthill, Kelso,	4 0 0

CHEVIOT SHEEP.

The County of Selkirk.

Tups.	Herbert Brydone, Thirlestanehope, Selkirk,	L.5 0 0
Shearling Tups.	Herbert Brydone, Thirlestanehope, Selkirk,	5 0 0
Shearling Ewes.	Gideon Scott, Singlee, Selkirk,	4 0 0

The Islands of Islay, Jura, and Colonsay.

Tups.	John Ramsay of Kildalton, Islay,	Silver Medal.
Tups.	William Webster, Daill, Islay,	L.5 0 0
Shearling Tups.	Colin Hay, Colmkill, Islay,	2 10 0*
Ewes.	Daniel M'Millan, Gortan, Islay,	5 0 0
Shearling Ewes.	Peter Carmichael, Baliming, Islay,	4 0 0

* Half Premiums awarded, the number of lots being under six.

The District of West Teviotdale.

TUPS.	William Turnbull, Merrylaw, Hawick,	Silver Medal.
TUPS.	John Moffat, Craik, Hawick,	L.5 0 0
SHEARLING TUPS.	John Moffat, Craik, Hawick,	5 0 0
EWES.	John Moffat, Craik, Hawick,	5 0 0
SHEARLING EWES.	John Moffat, Craik, Hawick,	4 0 0

The County of Peebles.

TUPS.	Sir G. G. Montgomery, Bart., M.P.,	Silver Medal.
TUPS.	John Gracie, Castlehill, Peebles,	L.5 0 0
SHEARLING TUPS.	John Gracie, Castlehill, Peebles,	5 0 0
EWES.	Robert Ballantyne, Wormiston, Eddleston,	2 10 0*
SHEARLING EWES.	Robert Ballantyne, Wormiston, Eddleston,	2 0 0*

BLACKFACED SHEEP.

The County of Dumbarton.

TUPS.	William Turner, Gavinburn, Old Kilpatrick,	Silver Medal.
TUPS.	Duncan Macfarlane, Strone, Row,	L.5 0 0
SHEARLING TUPS.	William Turner, Gavinburn,	2 10 0*
EWES.	William Turner, Gavinburn,	2 10 0*
SHEARLING EWES.	John Phillips, Low Park, Milngavie,	2 0 0*

The Districts of Badenoch and Rothiemurchus.

TUPS.	Messrs Macdonald, Strathmashie, Kingussie,	Silver Medal.
TUPS.	Messrs Macdonald, Strathmashie, Kingussie,	L.5 0 0
SHEARLING TUPS.	Neil P. Stewart, Biallid, Kingussie,	5 0 0
EWES.	Messrs Macdonald, Strathmashie, Kingussie,	2 10 0*

SWINE.

The District of the Moffat Society.

SOWS.	A. A. Blues, Dalrusken, Dumfries,	L.1 10 0*

The District of the Jedburgh Society.

BOARS.	1. Robert Bell, Cessford, Jedburgh,	L.4 0 0
	2. Robert Laidlaw, Denholm, Hawick,	2 0 0
SOWS.	1. Robert Bell, Cessford, Jedburgh,	3 0 0
	2. J. Crosbie, Hundalee Mill, Jedburgh,	1 0 0

DAIRY PRODUCE.

The District of Kintyre.

CURED BUTTER.	1. James Templeton, Whitehill, Campbeltown,	L.3 0 0
	2. Samuel Mitchell, Strath, Campbeltown,	2 0 0
SWEET-MILK CHEESE.	1. Samuel Mitchell, Jr., Chescan, Campbeltown,	3 0 0
	2. John Sommerville, Bulloch, Campbeltown,	2 0 0

The District of Nithsdale.

CURED BUTTER.	1. John M'Kie, Woodhead, Thornhill,	L.3 0 0
	2. James Grierson, Morton Mains, Thornhill,	2 0 0
SWEET-MILK CHEESE.	1. James Moffat, Gateside, Sanquhar,	3 0 0
	2. George Corson, Marr, Thornhill,	2 0 0

* Half Premiums awarded.

The County of Wigtown.

CURED BUTTER.	1. John Paterson, Colfin, Stranraer, . .	L.3 0 0
	2. John M'Credie, Tennachrae, Stranraer, .	2 0 0
SWEET-MILK CHEESE.	John M'Clew, Dinvin, Port-Patrick,	Silver Medal.
	1. George Cowan, Mains of Park, Glenluce,	L.3 0 0
	2. John Hardie, Mull of Galloway, Kirkmaiden,	2 0 0

The County of Ayr.

CURED BUTTER.	Alex. Blane, Alton, Albany, Barr, . .	Silver Medal.
CURED BUTTER.	1. John White, Dykescroft, Kilmarnock, .	L.3 0 0
	2. Gavin Muir, Fingart, Dunlop, . .	2 0 0
FRESH BUTTER.	Peter Connar, Drumdow, Stair, . .	Silver Medal.
SWEET-MILK CHEESE.	Alex. Blane, Alton, Albany, Barr, . .	Silver Medal.
SWEET-MILK CHEESE.	1. Alex. Young, Yonderton, West Kilbride,	L.3 0 0
	2. James Cooper, Whitehill, Dailly, . .	2 0 0

SEED COMPETITIONS.

The Silver Medal has been awarded to the following:—

The County of Inverness.

Evan Logan, Stoneyfield, Inverness, for White Wheat.
Hugh A. Gair, Hilton, Inverness, for Chevalier Barley.
John Smith, Drumbuie, Drumnadrochit, for Sandy Oats.
William Cameron, Upper Muckovie, Inverness, for Perennial Rye-Grass Seed.

The County of Stirling.

Thomas Murdoch, Westwood, Stirling, for Wheat (M'Ewan's).
James Anderson, Cornton, Bridge of Allan, for Common Barley.
John Blair, Clayhills, Cambusbarron, Stirling, for Early Blainslie Oats.

The District of Wester Ross.

Alex. Allan, Drummond, Evanton, for White Essex Wheat.
William Walker, Fyrish, Evanton, for Norfolk Barley.
William Walker, Fyrish, Evanton, for Sandy Oats.
Kenneth Grant, Kinellan, Strathpeffer, for Perennial Rye-Grass Seed.

The District of the Black Isle.

Alexander Thomson, Tarradale, Beauly, for Chevalier Barley.
Donald M'Kay, North Kessock, Inverness, for Potato Oats.

The County of Ayr.

Captain Campbell of Craigie, Ayr, for Archer's Prolific Wheat.
James Reid, Mid-Sanquhar, St Quivox, for Chevalier Barley.
Robert Montgomerie, Cockhill, Dundonald, for Oats (Tom Finlay).
William Dickie, Holmes, Kilmarnock, for Perennial Rye-Grass Seed.

The County of Nairn.

John Robb, Arr, Nairn, for Chevalier Barley.
Alexander F. M'Lennan, Meikle Urchany, Nairn, for Grey Angus Oats.
William Clark, Easter Brightmony, Nairn, for Perennial Rye-Grass Seed.

PLOUGHING COMPETITIONS.

In the course of the year 1861-62, the Society's Medal was awarded at 152 Ploughing Competitions, the details of which are given in the Transactions for October last.

MEDALS IN AID OF PREMIUMS GIVEN BY LOCAL SOCIETIES.

The Silver Medal has been awarded to the following:—

The District of Lorn.

John Stevenson, Balimore, Oban, for Highland Bull.

The District of Mar.

Alexander R. Walker, Wester Fintray, Kintore, for Shorthorn Cow.

The County of Renfrew.

Robert Wilson, Nether Johnstone, for Ayrshire Bull.

The County of Inverness.

Alex. Mackenzie, Alanfearn, Culloden, for Shorthorn Bull.

The District of Strathbogie.

Alex. Stewart, jun., Craigenseat, Huntly, for Shorthorn Bull.

The District of the Royal Northern Society.

George Shepherd, Shethin, Tarves, for Shorthorn Bull.

The District of the Forbes and Fordyce Association.

George Henderson, Towie, Aberdour, for Shorthorn Bull.
Samuel Stewart, Sandhole, Fraserburgh, for Shorthorn Cow.

The Western District of Midlothian.

David M'Gibbon, Inveravon, Polmont, for Ayrshire Bull.
John Kerr, Morton, Midcalder for Draught Mare.

The District of Breadalbane and Weem.

Peter Campbell, Balnaw, for best-kept Dunghill.
Alex. M'Naughton, Remony, for best Green Crop.
D. & A. M'Dougall, Miltown, for best Green Crop. (Crofters.)

The District of Wester Ross.

Murdo Bethune, Dreim, Beauly, for Draught Mare.

The District of Avondale.

Andrew Hamilton, Crewburn, Strathaven, for Ayrshire Bull.
James Leggate, Burnbank, Strathaven, for Ayrshire Cow.

The District of the Fettercairn Club.

John Durie, Denstrath, for Shorthorn Bull.
David Mitchell, Lower Powburn, for best Green Crop.

The District of the Mauchline Agricultural Society.

Andrew Young, Bruntwoodhill, for Ayrshire Bull and Cow.
Hugh Miller, Grassmillees, for best-managed Farm.
Hugh Miller, Grassmillees, for best Green Crop.

The District of the Mauchline Horticultural Society.

James Wallace, Piperhill, for best-kept Dairy.

The District of the Kincardineshire Club.

John Stephen, Commieston, for best-managed Green Crop.

The District of Penicuik.

Harry Maxwell Inglis, of Logan Bank, for Clydesdale Mare.
Thomas Stevenson, Mount Lothian, for Cheviot Tup.

The District of Leochel Cushnie.

Samuel Dunn, Easter Innenteer of Craigievar, Alford, for best Green Crop.

COTTAGES AND GARDENS.

For the Best-kept Cottages and Gardens.

First Cottage Premium L.1, 5s., and Medal when Four Competitors; Second, L.1 ; Third, 15s. First Garden Premium, L.1, 5s., and Medal when Four Competitors ; Second, L.1 ; Third, 15s.

Parish of Strichen.—1st Cottage Premium and Medal, Harry Emslie ; 2d, William Macdonald ; 3d, William Linn. 1st Garden Premium and Medal, Alex. Urquhart ; 2d, Harry Emslie.

Parish of Newburgh and Abdie.—1st Garden Premium and Medal, John Dall ; 2d, Henry Morris : 3d, George Moncrieff.

Parish of Urr.—1st Cottage Premium and Medal, Mrs Richardson; 2d, Mrs Postlethwaite ; 3d, Mrs Borrick. 1st Garden Premium and Medal, Mrs Craik ; 2d, Jane M'Burnie : 3d, Elizabeth Stewart.

Parish of Lamington.—1st Cottage Premium and Medal, Alexander Telfer ; 2d, Alexander Forest ; 3d, John Stewart.

Parish of Lesmahagow.—1st Garden Premium and Medal, Joseph M'Caskie ; 2d, James Faulds ; 3d, David Anderson.

Parish of Covington.—1st Cottage Premium and Medal, James Forrest ; 2d, Thomas Porteous ; 3d, William Henderson. First Garden Premium and Medal, William Martin ; 2d, William Purdie ; 3d, James Wood.

Parish of St Martin's.—1st Cottage Premium and Medal, James Bannerman ; 2d, William Kinnear ; 3d, William Butters. 1st Garden Premium and Medal, William Herd ; 2d, Hugh Niven ; 3d, Peter M'Laren.

Parish of Leswalt.—1st Cottage Premium and Medal, William Angus ; 2d, John Murray ; 3d, Samuel Gracie.

MEDALS GIVEN IN AID OF PRIVATE COMPETITIONS.

Mauchline Society.—Joseph W. Davidson for best-kept Cottage Garden.

Rayne.—William Reith, Kirkton of Rayne, for best-kept Cottage and Garden.

VETERINARY COLLEGE.

Silver Medals were awarded, at the Annual Examination in April last, to the following parties :—

1. Andrew Dunlop, Glasgow, for best Examination in Horse Pathology.
2. J. H. Boyce, Adlingfleet, Goole, for best Examination in Cattle Pathology.
3. Said J. H. Boyce, for best Examination in Anatomy.
4. George Sermon, Manchester, for best examination in Physiology.
5. William Worthington, for do. (Junior division.)
6. Said J. H. Boyce, for best examination in Chemistry.
7. Allan M'Culloch, Glasgow, for best examination in Materia Medica.
8. Said George Sermon, for best General Examination.

Jn. Hall Maxwell, *Secretary.*

Edinburgh, 14*th February* 1863.

PROCEEDINGS IN THE LABORATORY.

By THOMAS ANDERSON, M.D., Professor of Chemistry in the University of Glasgow, and Chemist to the Society.

NOTE ON THE VALUATION OF MANURES.

THE valuation of manures is naturally a subject of much importance to the farmer. In the present condition of agriculture his annual expenditure on these substances is very large; and as he relies on them, to no small extent, for a profitable return, it is of the utmost moment that he should not only know what it is he adds to the soil, but have some means of estimating its value, so that he may be sure that his money is well and economically expended. As the assistance of the chemist must be appealed to in order to determine the nature and proportions of the different fertilising ingredients contained in artificial manures, he has not unnaturally been assumed to be an authority on the question of their value, and expected to pronounce an opinion on this point as well as on their composition. In yielding to this demand the chemist has undoubtedly travelled beyond his own province, and touched upon a purely commercial question; and, so far as he is concerned, it would probably have been better if he had avoided it entirely, as he would thus have escaped the consideration of matters which often involve questions of much delicacy, requiring for their just and equitable solution both judgment and experience. And yet, on the other hand, there are many circumstances which peculiarly fit him for the discussion of such questions; and there is probably no person standing in an independent position to whom they can be equally well submitted. If he is extensively occupied with the analysis of manures, he acquires a large knowledge of their composition and peculiarities, and this experience enables him to go beyond the mere numerical results he obtains, and to form an accurate opinion, not only as to the nature of the raw materials employed, but also in some cases to detect any peculiarity in the process of manufacture. It is not easy for any one but a chemist to keep himself informed on all these points, which are constantly changing; for the composition and price, both of manures, as well as of the raw materials of which they are made, vary from year to year; and thus it happens that two of identical composition may not have exactly the same value, in consequence of one being made from cheap and the other from expensive substances. It is clear that the chemist only can bring out these facts; but when he uses them as a basis on which to fix the value of the manure, he proceeds to deal with commercial principles, and for his convenience he has laid down a system which, as I have more than once

stated, has been much misinterpreted, and used by others in a rough-and-ready manner, and without attending to those modifying circumstances which are necessary to give it precision.

The difficulties encountered in the valuation of manures have been recently discussed by Dr Voelcker in a paper which has appeared in the 'Journal of the Royal Agricultural Society of England,' with the conclusions contained in which I generally concur. Indeed no one who has attended to what I have written in the 'Transactions of the Highland and Agricultural Society,' can fail to see that the systems of valuation used by Dr Voelcker and myself are identical in principle; but in pointing out the nature of the difficulties occasioned by the rash application of the mode of valuation in common use, I think Dr Voelcker has opened a door by which other dangers may be introduced, unless great care is taken to guard against them; and I am induced to offer a few observations which may assist the farmer in doing so.

Dr Voelcker very justly observes that the tables which he, Mr Way, the late Mr Nesbit, and I myself gave some years since for the valuation of manures, are no longer correct, and therefore ought to be discarded, as they are only calculated to mislead. It must be understood, however, that they mislead, partly because they have been used in too literal a manner. It has been assumed that they may be applied, exactly as they stand, to all kinds of manures, whereas they are only intended to give an approximate valuation, and must be modified according to the nature of the manure to be valued, as I have distinctly pointed out in a paper published in 1860. There is no question, however, that these tables now require a far wider range of variation than they did when first contrived, and the reason is obvious to any one who has attended to the changes which have taken place in the manufacture of manures within the last few years. Eight or ten years since the most important manufactured manure was "dissolved bones," and the name applied to it accurately expressed its composition, for it really consisted of ordinary bones which had been treated with acid so as to dissolve a portion of the phosphates they contain. At the present moment a manure made exclusively from bones and acid is the exception and not the rule; and it may be safely asserted that, for every ton made in this way, there are twenty or thirty made from bone-ash, coprolites, apatite, or other materials, which are not only cheaper in themselves, but have the additional advantage of being more easily attacked by acids. By the use of these ingredients manures are produced which contain a much larger proportion of soluble phosphates than can be obtained from bones alone, and at a much cheaper rate, and hence the cost of that particular constituent of manures has been greatly reduced, *provided the farmer is content to take it from mineral sources.* Thus, for example, manures made from bone-ash and acid, with an admixture of coprolites in greater or

less quantity, and containing 30 per cent of soluble phosphates, can be produced at a price of somewhere about £7 per ton, and sometimes even for less, while, if calculated according to the tables formerly in use by Dr Voelcker and myself the soluble phosphates alone are worth £9 per ton. Obviously, therefore, those tables greatly exaggerate the value of such a manure, and the reason they do so is, that they were framed for the valuation of a different substance. When applied to "dissolved bones," meaning thereby a mixture of bones and acid without the addition of bone-ash, coprolites, or other similar substances, the tables are still sufficiently accurate. The dissolved bones of the present day differ little in composition from good samples produced seven or eight years since, and are very fairly represented by the following analysis:—

Water,	12.82
Organic matter,	23.75
Biphosphate of lime,	11.08
Equal to soluble phosphates,	(17.28)
Insoluble phosphates,	12.13
Sulphate of lime,	38.23
Alkaline salts,	2.11
Sand,	3.68
	100.00
Ammonia,	2.20

Valued by the tables formerly in use by Dr Voelcker and myself, this manure is worth about £7, 14s. per ton, and by those of the late Mr Nesbit only £6, 14s., while the price at which it would now be sold would be about £7, 10s. per ton. Of course I speak here of an average sample, for there are makers who now produce a larger quantity of soluble phosphates than is found in the above analysis; but this is most generally effected by the addition of bone-ash.

It must be observed that the great difference between the values as given in the tables already referred to and those derived from the selling price of manures at the present day, is due entirely to the diminished *cost of soluble phosphates.* All the other constituents of manures are as dear—some of them dearer—than they were ten years ago; and the reduced price is occasioned, to a certain extent, by the increased experience the manufacturers have gained in the course of that period, which has enabled them to use their acid with greater effect, but still more to the introduction of cheap raw material, such as coprolites and bone-ash. The extent of the economy in the manufacture of soluble phosphates thus occasioned will be understood when it is borne in mind that coprolites, containing 60 per cent of phosphates, can be bought at from £2 to £2, 10s. per ton, and bone-ash, with 70 per cent, for £4, 10s. or £5. Of course, with such substances they found it possible to

obtain a much larger percentage of soluble phosphates than was practicable when bones alone were employed; and as the value attached to that particular constituent of manures in the tables published by chemists was fixed at a time when high priced materials only were used, manufacturers saw the advantages they would gain by concentrating their efforts on converting the largest possible quantity of phosphates into the soluble form, and they did this by using the cheaper materials, though still claiming the value deduced from the dearer. In fact, they did not communicate to their customers the change which had taken place in their processes, but continued to sell under the name of dissolved bones manures composed, in great part, of bone-ash and coprolites. By using these substances they practically reduced the market price of soluble phosphates; but in place of explaining this, they continued to use the higher value contained in the published tables. It was then that chemists saw the inconvenience of the published tables, and found that it would be necessary to make some alteration, although every one hesitated to take the initiative, because it was not easy to determine the standard to be employed for constructing a new one. The delay and hesitation has been so far fortunate, because it has shown that there is now no possibility of forming a table which shall be constant, or equally applicable to all manures. I have particularly adverted to this in the paper already referred to,* remarking that variations in market price must be allowed for, and also that the same substance obtained from different sources has actually a different commercial value; and I explained that the value deduced from the tables require modification, according to the nature of the manure, and must not be used at random, without care and judgment. These considerations induce me to concur with Dr Voelcker in thinking that it is not advisable that any amended table of values should be published, because, with the close competition now existing in the manure trade, it would not have the requisite precision, unless it were altered at short intervals according to the fluctuations of the market.

Dr Voelcker remarks that the lower rate at which soluble phosphates can now be produced has occasioned a great change in the views entertained by some manufacturers; and those who were at one time totally opposed to the use of valuation-tables, are very ready to refer to them, because they find that the calculated price of a manure containing a large quantity of soluble phosphates exceeds that at which they can afford to sell it. The knowledge of this fact is, or at least may become, injurious to the interests of the farmer, because the manufacturers are thus induced to aim at making a manure which will, as they express it, "analyse well," without considering whether it is of a kind calculated to produce

* 'Highland Society's Transactions,' Oct. 1860.

the best effect upon the crops to which it is applied. He urges, and with justice, that there are manures which, when estimated according to the tables hitherto in use, do not give a value equal to the price put upon them, although experience has shown that in the field their action is highly beneficial, and hence these substances are apt to be neglected, and undue attention to be given to those which show high analytical results. It is very possible that this may occasionally occur, but I am satisfied that it has not nearly so much influence as Dr Voelcker supposes. The general run of farmers are much more easily induced to purchase a manure by satisfying them as to the results it gives in the field than by an appeal to an array of figures, which they very often do not understand.

Whatever evil consequences may follow the attempt to produce manures which will "analyse well," irrespective of other considerations, they are undoubtedly trifling when compared with those likely to be produced by the unfair use of Dr Voelcker's statement, that there are manures worth more to the farmer than their calculated value by the tables hitherto in use would make them. And it is very certain that *it* will be favourably received by the manufacturers of inferior manures. If there is one class of manufacturers whose sole aim is to make manures which will analyse well, there is another, and equally large one, who maintain that chemistry does them injustice, and that their manures are of a value infinitely higher than the analysis and valuation would lead people to suppose. The nature of the materials used, or some unexplained peculiarities in the process of manufacture, are alleged to give their manures an unequivocal superiority over those which analysis alone would show to be better. Thus it is sometimes asserted that by the process used the insoluble phosphates are brought into a state in which they are worth twice the price put on them by chemists, although neither analysis nor the most careful examination of the properties of the manure show any difference between it and others made from the same materials. In other cases it is the mode in which the ingredients are incorporated with one another which is the cause of the superiority. In nine cases out of ten these assertions are without foundation; but there can be no doubt that Dr Voelcker's statements will be greedily seized upon by the manufacturers of such manures, and in their hands be made to bear a construction which was never intended.

No difficulty or danger can arise from the use of the great principle that there are certain mixtures of manurial substances which will produce, on average soils, a better effect than others of greater apparent value, so long as it remains in the hands of those who are capable of applying it rightly. The difficulty is, that it is very open to abuse—much more so, indeed, than valuation tables, with all their faults. The fact is, that a valuation table of some kind must

always form the basis of the estimation of the fair price of every manure, and it is only modified by particular circumstances, such as the materials used, and similar considerations. The valuation tables hitherto used have become obsolete, chiefly because they were constructed originally for the valuation of dissolved bones made entirely from bones, and for Peruvian guano. For these manures they still give a reasonably accurate estimate, but they are quite inaccurate for other purposes. I have already referred to the fact that for superphosphates made from bone-ash and coprolites they give much too high a value, but, on the other hand, for phosphatic guanoes they are much too low. Take such a guano as the following, which sells for £8 per ton:—

Water,	10.88
Organic matter and ammoniacal salts,	10.34
Phosphates,	63.82
Sulphate of lime,	1.13
Carbonate of lime,	3.52
Alkaline salts,	2.11
Sand,	9.08
	100.00
Ammonia,	1.10

Calculating by the usual tables, the value is:—

Organic matter in 100 tons,	£ 5
Phosphates,	448
Sulphate of lime and alkaline salts,	3
Ammonia,	66
Value of 100 tons,	£522

or under £5, 5s. per ton. In the paper more than once quoted I have pointed out all this, and I did so for the purpose of warning the agricultural public against the erroneous extension of the valuation tables to manures for which they were not intended; but I fear the full force of what I then said has not been fully understood. The views there expressed are substantially those enunciated by Dr Voelcker in his recent paper, and it is quite obvious that the principle of valuation used by him and myself is practically identical. I am only anxious to guard against the erroneous interpretation which may be put on the statement that there are some manures more valuable than even a high valuation table shows. These are the exception, not the rule, and hence it will be understood that in all cases a valuation table must be the basis of calculation; but in the present state of the manure trade, and with a great variety of different substances made from different raw materials, the system of valuation has become much more complicated, and cannot be carried out in a routine system; and a table suited to the purpose cannot now be put into the hands of the public, because it requires judgment and experience on the part of those who use it.

Although this is the only system which can possibly be put in practice in the present state of the manure trade, and is, on the whole, fair and equitable to both buyer and seller, it is not without its difficulties. These, however, are mainly inherent in the system itself, and they are chiefly two. First, the farmer expects to obtain a mixture of all, or at least of several, of the essential and important constituents of plants. Secondly, he does not hold out any inducement to the manufacturer to give him the best return for his money. Manufactured manures are made to imitate natural manures, and the farmer seeks, and the manufacturer endeavours to supply him with, a substance which shall, in some sort, resemble a guano. To do this he treats bones, bone-ash, coprolites, and other substances with acid, and adds to them sulphate of ammonia, woollen rags, &c., in order to obtain a sufficient quantity of nitrogenous matter, and he is guided in the proportions he uses by what his own experience, or that of farmers generally, has shown to act best on an average soil; but there is no means of modifying these proportions so as to meet the requirements of a particular district or soil. So far as guanoes are concerned, the farmer cannot help himself, as they are natural products, and must be taken as they are found. But this is a disadvantage they possess, because if he uses Peruvian guano, for example, as a source of ammonia, he is compelled to take the phosphates they contain, although he might dispense with them; and if he requires phosphates and supplies them by using a phosphatic guano, he must take one or two per cent of ammonia, which, from the peculiar condition of the soil, may not repay him for the price he is forced to give for it. But there is no reason why manufactured manures should imitate the imperfection of a natural mixture; and it would be much better if the farmer, in place of buying complex manures, which the maker has produced by mixing a variety of substances, would take them separately and mix for himself. In place of buying a manure composed of soluble phosphates, insoluble phosphates, and sulphate of ammonia, it would be more reasonable, and, when the system was fairly established, no doubt more economical, to buy each of these as a distinct commercial product, and use them in the proportions his individual experience, the nature of his practice, and the particular exigencies of his farm require. If this system were adopted, a great inducement would be held out to the manufacturer to produce each of these substances at the lowest possible price, because each would have its definite commercial value, which would be well known to both buyer and seller. Soluble phosphates would then be produced chiefly from coprolites, which would be the cheapest material, and the farmer would pay only for the phosphates rendered soluble, and would neglect all the other constituents in it, so that the manufacturer would not be entitled to claim any price for phosphates left insoluble, and

would be himself to blame for any deficiency in the quality of the product.

At the present moment little inducement is held out to the manufacturer to produce the highest possible quality of manures. The principle upon which the bargain is carried out between him and the farmer is, that he guarantees his manure to contain a certain proportion of valuable matters, and if on analysis it turns out to be below the guarantee, he makes a corresponding deduction from the price, but if it is above the mark, the farmer is not called upon to pay more. The way in which this operates is obvious to every one. As no premium is held out to the manufacturer for exceeding his guarantee, he is induced to avoid giving more than was bargained for. The materials are mixed so as to come as near the mark as possible, and the aim is rather to be under than over it, because if the buyer should test the quality of the manure, all that the maker has to do is to allow him a deduction for the want of materials which he has not put in, while every excess is so much lost; while further, if the farmer does not think it necessary to have the manure analysed, the maker is so far a gainer.

If, on the other hand, the farmer undertook to pay for all the manures he purchased according to the percentage of the valuable matters contained in it, *as the manure-maker does in making his purchases of raw materials*, and as is practised in all other trades, the greatest possible inducement would be held out to produce the most valuable manures which can be obtained, to the great benefit of the farmer, as highly concentrated manures would be produced, and the great expense of carrying to a distance large quantities of useless matters would be saved. Few farmers are aware of how much this operates to increase the price of manures of low value, on which the cost of carriage and other charges are extremely high. There are manures which are sold by the manufacturers at a price, including their profit, of £3, 10s., and when they come into the farmer's hands cost him £6, and sometimes even £7, per ton, the difference being made up of carriage, dealer's profit, interest on money, &c., &c., charges which would be hardly greater if the manure were of double value.

The agricultural interest is probably not ripe for a change such as I have now indicated, but it will undoubtedly, some time or other, take place, and be found an immense advantage to all parties concerned.

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PREMIUMS

OFFERED BY

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

IN

1862.

CONTENTS.

PRELIMINARY NOTICE.

WHEN the HIGHLAND SOCIETY was instituted in the year 1784, and established by Royal Charter in 1787, its operation was limited to matters connected with the improvement of the Highlands of Scotland; but the supervision of certain departments, proper to that part of the country, having been subsequently committed to special Boards of Management, several of the earlier objects contemplated by the Society were consequently abandoned, while the progress of Agriculture led to the adoption of others of a more general character. The exertions of the Society were thus early extended to the whole of Scotland, and have, for three-quarters of a century, been directed to the promotion of the science and practice of Agriculture in all its branches.

In accordance with this more enlarged sphere of action, the original title of the Society was altered, under a Royal Charter in 1834, to THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND.

The leading purposes of the Institution are set forth in the following pages, where it will be found that Premiums are awarded for Reports on almost every subject connected with the cultivation of the soil; the rearing and feeding of stock; the management of the dairy; the growth of timber; the extension of cottage accommodation; the improvement of agricultural machinery and implements; and the dissemination of veterinary information.

Among the more important measures which have been effected by the Society, are—

1. Agricultural Meetings and General Shows of Stock, Implements, &c., held in the principal Towns of Scotland, at which exhibitors from all parts of the United Kingdom are allowed to compete.

A

2. A System of District Shows, instituted for the purposes of improving the Breeds of Stock most suitable for different parts of the country, and of aiding and directing the efforts of Local Agricultural Associations.

3. The encouragement and promotion of a proper system of Agricultural Education, by means of powers conferred by a Supplementary Royal Charter, authorising "The COUNCIL of the HIGHLAND AND AGRICULTURAL SOCIETY on EDUCATION" to prescribe a curriculum of study, and to grant Diplomas to Students of Agriculture who shall pass the requisite examination (see p. 57).

4. The Advancement of the Veterinary Art, by conferring the Society's Diploma on Students who have passed through a prescribed curriculum, and who are found, by examination, qualified to practise.

5. The appointment of a Chemist for the purpose of promoting the application of science to Agriculture. Investigations on subjects of importance are conducted in the Laboratory, and published in the Transactions. Members can obtain analyses, reports, and advice, on terms below those charged to others (see p. 59).

6. The establishment of an Agricultural Museum illustrative of the vegetable products of the country.

7. The periodical publication of the Transactions, which comprehend the proceedings in the Laboratory, reports of experiments, and other communications addressed to the Society. The Transactions are published by Messrs BLACKWOOD and SONS, Edinburgh, along with the *Quarterly Journal of Agriculture.*

CONSTITUTION AND MANAGEMENT.

The general business of the HIGHLAND AND AGRICULTURAL SOCIETY is conducted under the sanction and control of a Royal Charter, which authorises the enactment of Bye-Laws. Business connected with Agricultural Education is conducted under the authority of a Supplementary Royal Charter, also authorising the enactment of Bye-Laws.

The Office-Bearers consist of a President, Four Vice-Presidents, Ten Extraordinary, and Thirty Ordinary Directors, a Treasurer, an Honorary and an Acting Secretary. The proceedings of the Directors are reported to Half-yearly General Meetings of the Society, held in January, and in June or July. The Council on Education, under the Supplementary Charter, consists of Sixteen Members—Nine nominated by the Charter, and Seven elected by the Society. The Board of Examiners consists of Twelve Members.

New Members are admitted at the General Meetings by Ballot. The ordinary subscription is £1, 3s. 6d. annually, which may be redeemed by one payment, varying, according to the number of previous annual payments, from £12, 12s. to £7, 1s. Tenant-Farmers, Secretaries and Treasurers of Local Agricultural Associations, Factors, and Proprietors farming the whole of their own lands whose valuation does not exceed £500, are admitted on a subscription of 10s. annually, or £5, 5s. for life.

Members of the Society are entitled to apply for District Premiums,—to report Ploughing Matches for the Medal,—to attend Shows and exhibit Stock free of charge,—to consult the Chemist at reduced rates,—and to obtain the Journal and Transactions at a modified price.

The PREMIUMS awarded by the Society are payable after the 1st January for the preceding year. Orders, payable at the Royal Bank of Scotland, are issued by the Directors, in name of the parties in whose favour the Premiums have been awarded. The Orders will be delivered at the SOCIETY'S OFFICE, 6 ALBYN PLACE, Edinburgh, upon receipts being presented, or transmitted through any Bank, to the Secretary. Premiums not applied for within two years from the term of payment will be forfeited.

All communications are to be addressed to the Secretary of the Society, 6 ALBYN PLACE, EDINBURGH.

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ALL Reports must be legibly written, and on one side of the paper only; they must specify the number and subject of the Premium for which they are in competition; they must bear a distinguishing motto, and be accompanied by a sealed letter similarly marked, containing the name and address of the Reporter; initials must not be used.

None of the sealed letters, except those belonging to reports found entitled to at least one-half of the Premium offered, will be opened without the Author's consent.

Reports for which a Premium, or one-half of it, has been awarded become the property of the Society, and cannot be published, in whole or in part, nor circulated in any manner, without the consent of the Directors. All other papers will be returned to the Author if applied for within twelve months.

When a Report is unsatisfactory, the Society is not bound to award the whole, or any part of a premium.

All Reports must be of a practical character, containing the results of the writer's own observation or experiment, and the special conditions attached to each premium must be strictly fulfilled. General essays, and papers compiled from books, will not be rewarded. Weights and measurements must be indicated by the imperial standards.

The decisions of the Board of Directors are final and conclusive as to all Premiums, whether offered for Reports, or at general or district Shows, and it shall not be competent to raise any question or appeal touching such decisions before any other tribunal.

Reports on subjects not included in the Premium list will be received, and honorary rewards will be given, when merited.

CLASS I.

REPORTS.

Section 1. ON SUBJECTS CONNECTED WITH THE SCIENCE AND PRACTICE OF AGRICULTURE.

1. HIRING MARKETS.

1. For an approved Report on the best designed, the best managed, and the most useful Register for Farm Labourers in operation during the years 1861, 1862, and 1863. The Report shall specify the books used, the rules and regulations in force, the reference made to character, the names of masters and servants entered respectively as desiring servants or situations, and the number of masters and servants supplied during each of the above years, &c.—Twenty-five Sovereigns.

Reports to be lodged by 1st May 1864.

2. For an approved Report on the practical steps most successfully carried into operation for the regulation and improvement of any Hiring-Market held during the years 1861, 1862, and 1863,—taking into account the hours of opening and closing; the hours of arrival and departure of railway trains; the arrangements of the market, including the order, method, and locality of hiring; the nature of the registers in use; the extent to which they are employed; the facilities afforded by them for reference to character; the substitutes for drinking; the providing of temperance refreshments; the getting up and regulation of proper amusements for the people, &c.; the effect of the whole on the sobriety and morality of the people, and on lengthening the duration of service—Fifty Sovereigns.

Reports to be lodged by 1st May 1864.

2. AGRICULTURE OF ABERDEENSHIRE AND BANFFSHIRE.

For an approved Report on the Agriculture of Aberdeenshire and Banffshire—Twenty-five Sovereigns.

The Report should embrace full details of the different systems of farm management observed in the district, and of the progress which Agriculture has made within the last 25 years.

Reports to be lodged by 1st November 1862.

3. AGRICULTURE OF AYRSHIRE AND WIGTOWNSHIRE.

For an approved Report on the Agriculture of Ayrshire and Wigtownshire—Twenty-five Sovereigns.

The Report should embrace full details of the different systems of farm management observed in the district, and of the progress which Agriculture has made within the last 25 years. Particular reference must be made to the Dairy systems in use, and to the comparative advantages of making cheese on the Cheddar principle.

Reports to be lodged by 1st November 1863.

4. EFFECT OF SPECIAL MANURES OVER A ROTATION.

For an approved Report, to be made after a rotation, on the comparative effects, immediate and continued, of different special Manures—Thirty Sovereigns.

As the object of the premium is to encourage experiments for determining the value of various applications, as regards not only increased quantity and improved quality of crops, but also the permanence of the different substances throughout the rotation, the Report must have reference to points such as specific gravity and quality of turnips—weights of grain, straw, and hay—effects on straw and hay for fodder, and such like. The results obtained from each application to be compared with those of the ordinary manuring of the farm. Each experiment to be conducted on not less than one rood of land, and the whole to be repeated in duplicate, and the exact composition of the special manures used must be given.

Reports to be lodged by 1st November 1862.

5. PHOSPHATIC AND AMMONIACAL MANURES.

For an approved Report on the different effects of Phosphatic manures and Ammoniacal manures when applied to the raising of early and late sown turnips—The Gold Medal, or Ten Sovereigns.

Reports to be lodged by 1st November 1862.

6. SOLUBLE AND INSOLUBLE PHOSPHATES.

For an approved Report on the comparative effects of manures containing insoluble Phosphates, such as bone-ash and coprolites, and the same substances in which the Phosphates have been rendered soluble by acids—The Gold Medal, or Ten Sovereigns.

Reports to be lodged by 1st November 1862.

7. FISH OFFAL.

For an approved Report on the application of Fish Offal either in a raw or manufactured state as a manure—The Gold Medal, or Ten Sovereigns.

The experimenter should furnish full details of the progress of the crops, and compare the results with those obtained from guano, sulphate of ammonia, or other artificial manures.

Reports to be lodged by 1st November 1863.

8. MANURES PRODUCED BY DIFFERENT KINDS OF FEEDING.

For an approved Report of the result of experiments for ascertaining the comparative value of farm-yard manure, obtained from cattle fed upon different varieties of food, by the application of such manures to farm crops—Twenty Sovereigns.

The Report must state the effects produced on two successive crops by the application of manure obtained from cattle fed on different sorts of food, such as turnips and straw alone; and turnips and straw, with an addition of oil-cake, linseed, bean-meal, grain, or other substances. The animals should be as nearly as possible of the same age, weight, condition, and maturity, and each lot should receive daily the same quantity of litter; and, except as to the difference of food, they must be treated alike.

The preparation of the manure, by fermentation or otherwise, should be in every respect the same; and it is desirable that not less than two several experiments be made with each kind, and that the ground to which it is to be applied be as equal as possible in quality and condition.

Reports to be lodged by 1st May in any year.

9. MANURE MADE WITH AND WITHOUT COVER.

For an approved Report on the comparative value of Manure

made in the ordinary manner, and of Manure kept under cover till applied to the land.—Twenty Sovereigns.

The experiment may be conducted either with manure made in the open strawyard, contrasted with that made in covered hammels or boxes, or with manure made in feeding-houses, part of which shall have been placed under cover, and part removed to the open dung-pit, and kept carefully unmixed with any other manure. Preference will be given to experiments embracing both of these modes. The cattle must be fed and littered alike. There must be at least an acre of land experimented on with each sort of manure—the different lots must be manured to the same extent, and be equal in soil; on two separate portions of each, not less than 20 poles, the crops must be accurately weighed and measured. The result, as given by two successive crops, to be reported.

Reports to be lodged by 1st May in any year.

10. TOP-DRESSING FOR CEREALS.

For an approved Report on the substances which may be most profitably employed in top-dressing Cereal Crops—The Gold Medal, or Ten Sovereigns.

The Report must state the nature of the substances used, the time and cost of the application, and the comparative results, which must be contrasted with those obtained from a portion of the same field to which no top-dressing was applied.

Reports to be lodged by 1st November 1862.

11. AUTUMN MANURING.

For an approved Report on the comparative advantages of applying Manure to the stubble in Autumn, or in the drills in Spring for turnips, potatoes, or beans—Twenty Sovereigns.

The experiment must extend over two years, and comprise a green crop and a grain crop. It must be conducted on not less than four acres—one-half of which shall be dunged in autumn, and the other in spring, with manure, made as nearly as possible in the same way, and of equal quantity and quality. The quantities and kinds of special manures applied at any period of the rotation must be the same on each lot, and must be stated. The treatment and condition of the land prior to the experiment must be mentioned.

As the object of this premium is to determine the comparative

advantages of autumn manuring, there will be no restriction as to labouring the land, but the Reporter must state how that was done on each lot during the experiment.

Reports to be lodged by 1st May 1863.

12. IMPROVED VARIETIES OF AGRICULTURAL PLANTS.

For an approved Report on the means successfully employed for obtaining new and superior varieties, or improved sub-varieties, of any of the cereal grains, grasses, roots, or other agricultural plants—The Gold Medal, or Ten Sovereigns.

It is necessary that the varieties and sub-varieties reported upon shall have been proved capable of reproduction from seed, and also that the relation they bear to others, or well-known sorts, should be stated. The Reporter is further requested to mention the effects that he may have observed produced by different soils, manures, &c., on the plants forming the subjects of reports, and how far he may have ascertained such effects to be lasting.

Should any improved variety reported upon be the result of direct experiment by cross impregnation, involving expense and long-continued attention, a higher premium will be awarded.

Reports to be lodged by 1st November 1862.

13. DIFFERENT KINDS OF WHEAT.

For an approved Report of experiments conducted for the purpose of determining the relative productiveness in corn and straw of Hunter's, Hopetoun, Fenton, and any other variety of White Wheat—Twenty Sovereigns.

The Experiment must embrace crops 1863 and 1864. Intention to compete must be intimated to the Secretary not later than 1st January 1863. The soil shall be uniform in quality and condition. One acre must be allowed for each kind of wheat, and the lots must be separated by spaces not less than two feet wide. Care must be taken to select true samples of seed for crop 1862, the produce of which shall be used as seed in 1863. Samples of the original seed, and of each year's crop, to be lodged with the Report. The wheats to be sown, by drill or broadcast, not later than November, and the crops shall be inspected by a committee in May and July following. The whole produce shall be weighed and measured; and care must be taken thoroughly to cleanse the threshing-machine previous to testing each variety. The Report shall further specify the quantity of each variety of seed sown—where it was obtained—the dates of sowing, brairding, earing,

ripening—the properties and appearances of the crops when growing—and the produce each year in corn and straw.

Reports to be lodged by 1st November, 1864.

14. DIFFERENT KINDS OF OATS.

For an approved Report of experiments conducted for the purpose of determining the relative productiveness in corn and straw of not fewer than four varieties of Oats—Fifteen Sovereigns.

The Experiment must embrace crops 1861 and 1862. Intention to compete must have been intimated to the Secretary not later than 1st May 1861. The soil shall be uniform in quality and condition. One acre must be allowed for each variety, and the lots must be separated by spaces not less than two feet wide. Care must have been taken to select true samples of seed for crop 1861, the produce of which shall be used as seed in 1862. Samples of the original seed, and of each year's crop, to be lodged with the Report. The oats may be sown, by drill or broadcast, and the crops shall be inspected by a committee in June and July following. The whole produce shall be weighed and measured; and care must be taken thoroughly to cleanse the threshing-machine previous to testing each variety. The Report shall further specify the quantity of each variety of seed sown—where it was obtained—the dates of sowing, brairding, earing, ripening—the properties and appearances of the crops when growing—and the produce each year in corn and straw.

Reports to be lodged by 1st November 1862.

15. INTERMEDIATE CROP OF TURNIP, RAPE, &C.

For an approved Report on the best mode of cropping land with an intermediate crop of Turnip, Rape, &c., when a white crop is intended to follow an early lifted crop of Potatoes.—The Medium Gold Medal, or Five Sovereigns.

The Report must show the effect on the after white crop, as compared with the results on a part of the same land from which no intermediate crop shall be taken.

Reports to be lodged by 1st November 1862.

16. COMPARATIVE PRODUCTIVENESS, &C., OF POTATOES.

For an approved Report on the comparative productiveness, and general qualities for use and keeping, of the different kinds of

Potatoes used in field culture, and the results observable on the white crops following different varieties of Potatoes—The Medium Gold Medal, or Five Sovereigns.

Reports to be lodged by 1st May 1863.

17. COMPARATIVE PRODUCTIVENESS, &c., OF TURNIPS.

For an approved Report of the comparative productiveness, and general qualities for use and keeping, of the different kinds of Swedish, Yellow, and White Turnips, generally used in field culture, and the results observable on the white crops following different varieties—The Medium Gold Medal, or Five Sovereigns.

Reports to be lodged by 1st May 1863.

18. MANGOLD-WURZEL.

For an approved Report on the cultivation of Mangold-Wurzel—The Medium Gold Medal, or Five Sovereigns.

The Reporter must state the nature and previous preparation of the soil—the varieties grown—the period of sowing—the quantity of seed per acre, and mode of sowing—the time and mode of thinning and cleaning—the best means of preventing seeding—the time and manner of storing—the crop obtained—and its comparative value for feeding purposes.

Reports to be lodged by 1st May 1863.

19. CARROTS.

For an approved Report on the cultivation of the Carrot as a field-crop—The Medium Gold Medal, or Five Sovereigns.

Reports to be lodged by 1st May 1863.

20. CABBAGE.

For an approved Report on the cultivation of the Cabbage as a field crop—The Medium Gold Medal, or Five Sovereigns.

The experiment must be conducted on not less than one acre, and contrasted with a like extent under turnips in the same field. Both lots must have been under one rotation, and must be prepared and manured in the same manner.

Reports to be lodged by 1st May 1863.

21. VEGETABLE PRODUCTIONS OF INDIA, CHINA, AMERICA, &C.

For an approved Report on the hardy and useful Herbaceous Plants, including Grains and Grasses of China, Japan, the Islands of the Eastern Archipelago, the Himalaya Country, the Falkland and South Sea Islands, California, the high north-western districts of America, or any other country where such climate exists as to induce the belief that the plants may be beneficially introduced into the cultivation of Scotland—The Gold Medal, or Ten Sovereigns.

Reporters are required to give the generic and specific names of the plants treated of, with the authority for the same—together with the native names, in so far as known; and to state the elevation of the locality and nature of the soil in which they are cultivated, or which they naturally inhabit, with their qualities or uses; and it is further requested that the descriptions be accompanied, in so far as possible, with specimens of the plants, and their fruit, seed, or other products.

Reports to be lodged by 1st November in any year.

FEEDING STOCK.

The experiments specified in Nos. 22, 23, 24, and 25, must be conducted over a period of not less than three months. No lot shall consist of fewer than four Cattle or five Sheep. The animals selected should be of the same age, sex, and breed, and, as nearly as possible, of the same weight, condition, and maturity. Their live weight before and after the experiment must be stated, and, if killed, their dead weight and quantity of tallow.

22. BEST MODES OF HOUSING FATTENING CATTLE.

For an approved Report on the comparative advantages of fattening Cattle in stalls, in loose houses or boxes, and in sheds or hammels—Twenty Sovereigns.

The Report must detail the comparative result of actual experiments. The same quantities and kinds of food shall be used. Information is required as to the comparative expense of attendance, the cost of erecting the buildings, and any other circumstances deserving of attention. The state of the weather during the experiment in point of temperature and wetness must be particularly noted and reported.

Reports to be lodged by 1st May 1863.

23. DIFFERENT DESCRIPTIONS OF FOOD.

For an approved Report of experiments for ascertaining the actual addition of weight to growing or fattening stock, by the use of different kinds of Food—Twenty Sovereigns.

The attention of the experimenter is directed to turnips, carrots, beet, mangold-wurzel, potatoes, cabbage, as well as to beans, oats, barley, Indian corn, linseed, oil-cake, or rape-cake, and to the effect of warmth and proper ventilation, and the difference between food cooked and raw. The above roots and other kinds of food are merely suggested; Competitors are neither restricted to them, nor obliged to experiment on all of them.

When experiments are made with linseed and cake, attention should be paid to the comparative advantages, economically and otherwise, of the substances in these two states.

Before commencing the comparative experiments, the animals must be fed equally for some time previously.

The progress of different breeds may be compared; this will form an interesting experiment of itself, for Reports of which encouragement will be given.

Reports to be lodged by 1st May 1863.

24. COMPARATIVE FEEDING QUALITIES OF LINSEED-CAKE AND RAPE CAKE.

For an approved Report on the comparative feeding qualities of Linseed-Cake and of Rape-Cake, to be ascertained by feeding two lots of Cattle on each of these substances, with or without Turnips, or other ordinary food, equal quantities of the two cakes being given—The Gold Medal, or Ten Sovereigns.

Reports to be lodged by 1st May 1863.

25. COMPARATIVE FATTENING QUALITIES OF PURE AND CROSS-BRED SHEEP.

For an approved Report of experiments for determining the comparative fattening qualities of pure and cross-bred Sheep—The Gold Medal, or Ten Sovereigns.

One lot must consist of any pure breed, the other of any cross between that and another breed. The same descriptions of food must be given; the quantities consumed, and the increase in the weight and value of each lot, must be carefully noted.

Reports to be lodged by 1st May 1863.

26. WEED IN HORSES.

For an approved Report on the nature, symptoms, causes, preventive and remedial treatment, and *post mortem* appearances, of Weed in Horses—The Gold Medal, or Ten Sovereigns.

Reports to be lodged by 1st November 1862.

27. BRAXY IN SHEEP.

For an approved Report on the nature, symptoms, causes, preventive and remedial treatment, and *post mortem* appearances, of Braxy in Sheep—The Gold Medal, or Ten Sovereigns.

Reports to be lodged by 1st November 1862.

28. SCAB IN SHEEP.

For an approved Report on the nature, symptoms, causes, preventive and remedial treatment, of Scab in Sheep—The Gold Medal, or Ten Sovereigns.

Reports to be lodged by 1st November 1862.

29. RURAL ECONOMY ABROAD.

For an approved Report, founded on personal observation, of any useful practice, in rural economy, adopted in other countries, and susceptible of being introduced with advantage into Scotland —The Gold Medal.

The purpose chiefly contemplated by the offer of this premium is to induce gentlemen who may visit other countries to notice and record such particular practices as may seem calculated to benefit their own country.

Reports to be lodged by 1st November in any year.

SECTION 2. WOODS AND PLANTATIONS.

1. EXTENSIVE PLANTING.

For an approved Report by a Proprietor who shall, within the five preceding years, have planted not less than 150 acres. The whole planting operations that may have been conducted by the

Reporter within the five years, whether completed or not, must be embraced, and he must state the expense—description of soil—age, kind, and number of trees planted per acre—mode of planting, draining, and fencing—and general state of the plantation—and any other observations of interest—The Gold Medal.

Reports to be lodged by 1st November in any year.

2. FORMATION AND MANAGEMENT OF YOUNG PLANTATIONS.

For an approved Report of Plantations formed within a period of not more than ten, nor less than five years preceding the date of the Report—The Gold Medal, or Ten Sovereigns.

The Report should comprehend every interesting particular; among others, the exposure, altitude, and general climate of the locality—the character and condition of the soil and subsoil—a detailed statement of the expense, including that of enclosing, draining, and fencing, and a specification of the manner in which these operations were performed—the mode of planting adopted—the prevailing weather while planting, and for a month after the operation—the kind of trees planted, and the number of each kind per acre—their relative progress—the proportion of blanks and deaths at the end of three years—the system of management—the state of the plantations at the date of making the Report—and any other observation of interest.

Reports to be lodged by 1st November in any year.

3. GENERAL MANAGEMENT OF PLANTATIONS.

For an approved Report of the management of Plantations, from the commencement of the first thinning till the period of yielding full-grown timber—The Gold Medal, or Ten Sovereigns.

The Report should embrace the following points: The progress of the different sorts of trees—the effects of altitude and exposure—the general advantages of shelter—the mode of thinning and pruning adopted—the uses and value of the thinnings—the plan of registry and of valuing, or a specimen of the method in which the forester's book is kept—the valuation at the time of the Report—together with such general remarks as may be thought useful.

The Report is not expected to embrace the formation and early management, further than the description of soil, kinds of plants, whether mixed or in masses, together with a note of the expense

from the time of planting to the commencement of the first thinning, in so far as such information is in the possession of the Reporter.

Reports to be lodged by 1st November in any year.

4. USES AND VALUE OF TIMBER.

For an approved Report on the economic uses and comparative value of different descriptions of Timber grown in Scotland—The Gold Medal, or Ten Sovereigns.

This premium may be regarded as a sequence to Nos. 2 and 3; the object being to obtain the practical and economic results of forming and of managing woods, by ascertaining the purposes to which they have been applied, and the pecuniary returns they have yielded.

The Reporter, besides stating the actual results of his own observation and experience, should indicate the objects which planters ought to have in view with reference to profitable return, by stating the kinds of trees that should be planted—the periods at which they should be cut—the purposes to which they should be applied—and the returns that may be looked for, in different localities, and under different circumstances.

There must be a general description of the management, soil, altitude, exposure, &c., of the particular woods reported on, and attention is directed to the difference supposed to exist in the quality of natural and planted timber.

Reports to be lodged by 1st November in any year.

5. MIXED PLANTATIONS.

For an approved Report on the trees best adapted for giving a pleasing effect to the landscape, during different seasons—The Medium Gold Medal, or Five Sovereigns.

Much is still to be done in judiciously grouping and arranging trees in large policies, particularly as regards the autumnal effect; attention is therefore particularly directed to contrasts of colour, and a list of varieties must be given.

Reports to be lodged by 1st November 1862.

6. COMPARATIVE QUALITIES OF SCOTCH, AUSTRIAN, AND CORSICAN FIR.

For an approved Report on the comparative value, for econo-

mical purposes, of the Scotch, Austrian, and Corsican Fir, and on their adaptation to different soils and situations—The Medium Gold Medal, or Five Sovereigns.

Reports to be lodged by 1st November in any year.

7. PLANTING WITHIN THE INFLUENCE OF THE SEA OR ON BARREN TRACTS.

For an approved Report on successful planting within the influence of the sea, or on exposed sterile tracts, founded on observation of the habits and appearance of the different sorts of trees considered best suited for such situations—The Gold Medal, or Ten Sovereigns.

The plantations reported on must not be less than ten years old.

Information is particularly desired regarding the species and varieties of trees calculated for growing in situations unfavourable to most of those generally cultivated, as bleak heaths, sandy links, unsheltered maritime situations, and high northern exposures.

The Reporter must specify the extent of planting and mode of drainage and fencing—the nature of the soil and subsoil—the elevation and exposure of the locality—its distance from the sea; and, if in his power, he should notice the geological features of the district.

Reports to be lodged by 1st November in any year.

8. PRUNING.

For an approved Report on advantages or disadvantages of pruning Forest Trees—The Medium Gold Medal, or Five Sovereigns.

The Reporter must consider the propriety of pruning as a general question, and the effects produced by pruning and by non-pruning both on hard wood and Coniferæ. He will state the Trees best adapted for pruning; and the period of the year, the age of the tree, and the circumstances under which it should be done; he will also report on the comparative effects of pointing and pruning, and the best method of pointing when that system is adopted.

Reports to be lodged by 1st November in any year.

9. DISEASES OF FOREST TREES.

For an approved Report on the diseases incidental to forest trees, and the injuries they sustain from the attacks of Insects—The Gold Medal, or Ten Sovereigns.

The Report must state the kinds of trees most generally liable to

attack—the parts first affected—the age of the tree and period of the season when first observed—the state of the drainage—the altitude and exposure of the locality, and its geological formation—the nature of the soil and subsoil—when and how the trees were pruned—the remedies, preventive and remedial, which may have been tried. Information is required as to the causes of decay—whether attacks of insects, or cryptogamic growth—and how far either of these causes may have been induced by the previous sickly or stunted condition of the tree. Attention is particularly directed to the Larch, Silver Fir, and White Pine (*Pinus Strobus*), and to the Coniferæ generally, and particularly to the stripping the leaves from Scotch and other pines by the pine-leaf caterpillar.

Reports to be lodged by 1st November in any year.

10. VARIETIES OF LARCH.

For an approved Report on the species and varieties of Larch cultivated in Great Britain, embracing a statement of soil, situation, and conditions best adapted for each, their state of growth, and liability to disease, compared with *Larix Europeæ*—The Medium Gold Medal, or Five Sovereigns.

Reports to be lodged by 1st November 1862.

11. AMERICAN AND CANADIAN TREES.

For an approved Report on the American and Canadian forest trees adapted for cultivation in Great Britain—The Medium Gold Medal, or Five Sovereigns.

The Reporter will enumerate and describe the varieties which have been, or which may be, usefully introduced from North America; the soils, situations, and conditions most suitable for them, their economic uses and qualities, and the success which may have attended the cultivation of any of them in Great Britain.

Reports to be lodged by 1st November 1862.

12. FOREST TREES OF RECENT INTRODUCTION.

For an approved Report on the more extended introduction of hardy, useful, or ornamental trees, which have not hitherto been generally cultivated in Scotland—The Medium Gold Medal, or Five Sovereigns.

The Report should specify, as distinctly as possible, the kind of trees introduced. The nature of the plantation should likewise be described as to soil, exposure, shelter, and elevation above the level

of the sea. The adaptation of the trees for use or ornament, and their comparative progress, should be mentioned. Attention is directed to the introduction into use of any tree as a nurse in young plantations, which, by growing rapidly for several years, and attaining maturity when at the height of 20 or 25 feet, might realize the advantages and avoid the evils of thick planting.

Reports to be lodged by 1st November in any year.

13. IMPORTATION OF SEEDS.

To the person who shall send to the Society seeds capable of germination, either of new or recently-introduced Coniferæ, or of the rarer kinds of forest trees—The Medium Gold Medal.

Before the Premium is awarded, the number of seedling plants ot each species raised by the Society shall not have been less than 50. Seeds of Coniferæ may be sent home in the cones, wrapped in brown paper, packed in a box, to be kept in a cool, airy part of the cabin, but on no account in the hold, *nor* in close tin cases. Hasty and severe heating in extracting seeds from the cone should be carefully avoided. Seeds of hardwood may be packed in brown paper, or in sphagnum (moss), or they may be mixed with soil and placed in strong boxes.

Seeds may be forwarded at any time.

14. GROWTH OF RECENTLY INTRODUCED CONIFERÆ.

With the view of ascertaining the progress of Coniferæ introduced within the last 30 years, and the most suitable relations of soil, altitude, exposure, &c., Members of the Society and others are requested to forward, in the subjoined form, whatever information they can afford, with the view to its being tabulated and published. The following trees may be reported on:—

Araucaria imbricata, Cedrus Deodara, Abies Douglassi, A. Menziesii, A. Morinda, Picea nobilis, P. cephalonica, P. Pinsapo, Pinus Laricio, P. excelsa, P. Lambertiana, P. monticola, P. ponderosa, Cupressus torulosa, P. macrocarpa.

Name of Tree.	Seedling or Transplanted.	Where Seed or Plant got.	Age.	Size.	Soil.	Subsoil.	Altitude.	Exposure.	Present Condition.	Where growing.	General Remarks.

15. ROOTS OF CONIFERÆ.

For an approved Report of experiments on the uses to which the fibrous parts of the roots of Coniferous Trees may be applied —The Medium Gold Medal, or Five Sovereigns.

In North-West America, the fibrous parts of the roots of some of the Coniferous trees are extensively employed for purposes similar to those to which willows are applied in this country, more particularly when the wood has been grown in soft peaty soils. The object of the premium is to elicit information regarding the possibility of profitably extracting, and economically applying the vast quantities of roots left in the ground.

Reports to be lodged by 1st November in any year.

SECTION 3. LAND IMPROVEMENTS.

1. GENERAL IMPROVEMENT OF ESTATES.

To the Proprietor who shall report the most judicious, successful, and extensive improvement of an Estate—The Gold Medal, or Ten Sovereigns.

The merits of the Report will not be determined so much by the mere extent of the improvements, as by their character and relation to the size of the property. The improvements may comprise reclaiming, draining, enclosing, planting, road-making, building, and all other operations proper to landed estates. The period within which the operations may have been conducted is not limited, except that it must not exceed the term of the Reporter's proprietorship.

Reports to be lodged by 1st May in any year.

2. RECLAMATION OF WASTE LAND BY TILLAGE.

1. For an approved Report by a Proprietor or Tenant of the reclaiming, within the six preceding years, of not less than fifty acres of Waste Land—The Gold Medal, or Ten Sovereigns.

2. For an approved Report by a Tenant of the reclaiming, within the four preceding years, of not less than twenty acres of Waste Land—The Medium Gold Medal, or Five Sovereigns.

3. For a similar Report by a Tenant of the reclaiming of not less than ten acres—The Silver Medal.

The Reports may comprehend such general observations on the improvement of waste lands as the writer's experience may lead him to make, but must refer especially to the land reclaimed—to the nature of the soil—the previous state and probable value of the subject—the obstacles opposed to its improvement—the details of the various operations—the mode of cultivation adopted—and the produce and value of the crops produced. As the required extent cannot consist of different patches of land, the improvement must have relation to one subject, it must be of a profitable character, and a rotation of crops must have been concluded before the date of the Report. *A detailed statement of the expenditure and return*, and a certified measurement of the ground, are requisite.

Reports to be lodged by 1st May in any year.

3. IMPROVEMENT OF NATURAL PASTURE WITHOUT TILLAGE.

1. For an approved Report of the improvement of the pasturage of not less than thirty acres, by means of Top-Dressing, Draining, or otherwise without tillage, in situations where tillage may be inexpedient—The Gold Medal, or Ten Sovereigns.

2. For an approved Report of a similar improvement of not less than ten acres—The Silver Medal.

Reports must state the particular mode of management adopted, the substances applied, the elevation and nature of the soil, its previous natural products, and the changes produced.

Reports to be lodged by 1st May in any year.

SECTION 4. AGRICULTURAL MACHINERY.

1. INVENTION OR IMPROVEMENT OF IMPLEMENTS OF HUSBANDRY.

For approved Reports of such inventions or improvements, by the Reporters, of any Agricultural Implement or Machine as shall be deemed by the Society of public utility—Medals, or sums not exceeding, in all, Fifty Sovereigns.

Reports may be lodged with the Secretary at any time, and should be accompanied by drawings and descriptions of the implement or machine, and, if necessary, by a model.

2. REAPING MACHINES.

For an approved Report on the Reaping Machine—The Gold Medal, or Ten Sovereigns.

The Report must embrace the history of the Reaping Machine from its earliest introduction; its progress in this and other countries; its various modifications and improvements; the character, qualities, and price, of the various machines before the public at the date of the Report; a record of the principal competitive trials at different periods, and their results; and a comparison of the expense, and other advantages or disadvantages of reaping by sickle, scythe, or machine.

Reports to be lodged by 1st May 1863.

CLASS II.

DISTRICT COMPETITIONS.

(*Grants in aid of* District Competitions *for* 1863 *must be applied for before* 1*st* November *next.*)

Section I. CATTLE.

DISTRICTS.

1. *The District of the Border Union Society.*
2. *The County of Elgin.*
3. *The County of Fife.*
4. *The District of the Clackmannanshire Society.*
5. *The District of the Auchterarder Society.*
6. *The District of the Perth, Fife, Kinross, and Clackmannan Association.*
7. *The District of the Spey, Avon, and Fiddochside Society.*
8. *The District of Cowal.*
9. *The District of the Royal Northern Society.*
10. *The District of the Deeside Association.*
11. *The District of Lorn.*
12. *The District of the Mar Association.*
13. *The County of Ayr.*
14. *The County of Renfrew.*
15. *The County of Stirling.*
16. *The County of Inverness.*
17. *The District of the Strathbogie Club.*

Conveners of Committees.

First District—Lord Polwarth.
Second District—Robert Grant of Kincorth.
Third District—Alexander Bethune of Blebo.
Fourth District—James Johnstone of Alva.
Fifth District—Viscount Strathallan.
Sixth District—Lord Kinnaird, K.T.
Seventh District—Sir George Macpherson Grant, Bart.
Eighth District—Alexander S. Finlay of Castle Toward, M P.
Ninth District—Alexander Thomson of Banchory.
Tenth District—Sir James H. Burnett, Bart.

Eleventh District—Dugald Macdougall of Gallanach.
Twelfth District—Archibald Grant of Tillyfour.
Thirteenth District—Sir James Fergusson, Bart., M.P.
Fourteenth District—Lieut.-Col. Mure of Caldwell.
Fifteenth District—John Stirling of Kippendavie.
Sixteenth District—Æneas W. Mackintosh of Raigmore.
Seventeenth District—Robert Simpson of Cobairdy.

PREMIUMS.

1. For the best Bull, of any pure Breed, not exceeding eight years old, belonging to a Proprietor or Factor—The Silver Medal.
2. For the best Bull, of any pure Breed, calved before 1st January 1860, and not exceeding eight years old, belonging to a Tenant, or Proprietor farming the whole of his own lands, . . . £8
3. For the second best, ... £4
4. For the best Bull, of any pure Breed, calved after 1st January 1860, belonging to a Tenant, or Proprietor farming the whole of his own lands, . . £5
5. For the best pair of Heifers, of any pure Breed, of two years old (if Highland breed, three years), belonging to a Tenant, or a Proprietor farming the whole of his own lands, ... £5
6. For the second best, ... £3

Note.—The Society's Premiums are granted to each district for three alternate years, on condition that the District shall, in the two intermediate years, continue the Competitions by offering for the same description of stock a sum not less than one-half of that given by the Society.

At the intermediate Competitions, a Silver Medal will be placed at the disposal of the Committee to be awarded to the best lot exhibited.

In 1862,

Nos. 1, 2, 3, 4, 5, 6, and 7, are in competition for the last year.
Nos. 8, 9, and 10, for the second year.

Nos. 11, 12, 13, 14, 15, 16, and 17, compete for local Premiums.

RULES OF COMPETITION.

1. The Members of the Society connected with the respective Districts are appointed Committees of superintendence for regulating the Competitions; five members to be a quorum.

2. The Convener of each district shall summon a Meeting of Committee for the purpose of determining the time and place of Competition, the nomination of Judges, and other preliminary arrangements. The time and place (which must be within the bounds of the district) shall be publicly intimated by Conveners, in such a manner as may appear to them most effectual.

3. The Competitions must take place before the 1st of November. The animals exhibited must belong to one of the following pure breeds:—Shorthorn—Ayrshire—Polled (Galloway, Angus, or Aberdeen)—Highland. The Bulls may be of one Breed, and the Heifers of another. The Committee shall select the Breed, and specify it in the returns.

4. Stock of an inferior description, or which does not fall within the prescribed regulations, shall not be placed for Competition. The Premiums shall not be divided. *No Money Premium shall be adjudged unless there are three lots exhibited, and not more than one-half unless there are six.* A Competitor may exhibit two Lots in each class. For the Medal, two Lots authorise an award.

5. An animal which has gained the Society's first Premium at a previous District or General Show is inadmissible in the same class, except for the Medal; and one which has gained a second Money Premium can only thereafter compete in that class for the first.

6. A Tenant may compete with Proprietors and Factors for the Medal with a Bull which has gained the first Money Premium at a previous Show. When there is any doubt as to whether a Competitor should be ranked as a Proprietor or a Tenant, the point is left to the decision of the Local Committee. Factors can only compete for the Medal.

7. A Bull, the Property of two or more Tenants, may compete, although the Exhibitors may not be joint tenants. Bulls not belonging to the District may compete, provided they are left within it for service.

8. Stock must be the property of the Exhibitor at the date of entry, *and no entry shall be received later than one week previous to the Show.*

9. Bulls for which the Money Premiums are awarded, must serve in the District at least one season; the rate of service may be fixed by the Committee.

10. Should it be proved to the satisfaction of the Directors that an animal has been entered under a false name, pedigree, or description, for the purpose of misleading the Directors or Judges as to its qualifications or properties, the case shall be reported to the first General Meeting, in order that the Exhibitor shall be disqualified from again competing at the Society's Shows, and his name, if he be a Member, struck from the roll.

11. When an animal has previously been disqualified by the decision of any Agricultural Association in Great Britain or Ireland, such disqualification shall attach, if the Exhibitor, being aware of the disqualification, fail to state it, and the grounds thereof, in his entry, to enable the Committee to judge of its validity.

12. Blank Reports will be furnished to the Conveners of the different Dis-

tricts. These must, in all details, be completed and lodged with the Secretary on or before the 1st of November next.

13. A Report of the Competition and Premiums awarded at the *intermediate* Local Shows, in the several Districts, signed by a Member of the Society, must be transmitted to the Secretary on or before the 1st of November in each year, otherwise the Society's grant shall terminate.

14. It is to be distinctly understood, that in no instance does any claim lie against the Society for expenses attending a Show of Stock, beyond the amount of the Premiums offered; and that all Premiums not applied for within two years from the term of Payment (1st January 1863) shall be forfeited.

SECTION 2. DRAUGHT HORSES.

DISTRICTS.

1. *The District of the Perth, Fife, Kinross, and Clackmannan Association.*
2. *The Stewartry of Kirkcudbright.*
3. *The District of Machars in Wigtownshire.*

Conveners of Committees.

FIRST DISTRICT—Lord Kinnaird, K.T.
SECOND DISTRICT—James Mackie of Bargaly, M.P.
THIRD DISTRICT—R. Vans Agnew of Barnbarroch.

PREMIUMS.

Forty Sovereigns (of which ten are contributed by the Local Associations) will be awarded as follows:—

1. For the best Stallion, for agricultural purposes, not under three years and nine months, and not above twelve years old, £25
2. For the best Brood Mare, for agricultural purposes, . £10
3. For the best Filly, foaled after 1st January 1860, . £5

These premiums are granted for two years.

In 1862.

Nos. 1, 2, and 3 are in competition for the last year.

RULES OF COMPETITION.

1. The Members of the Society in the District are appointed a Committee of Superintendence. They shall be convened in the manner and for the purposes prescribed by Nos. 1 and 2 of the Regulations for Cattle Competition.

2. The Competition for Stallions, and that for Mares and Fillies, may be held at different periods, but both must take place within the districts named.

3. If fewer than three animals be exhibited in any class, half the Premium only can be awarded. The Regulations for Cattle Shows, regarding previous

intimation to the Committee and Competitors—the entry of stock—its exclusion if of inferior character—false entries—extra expenses—the period within which Premiums must be applied for—and the manner in which the Reports are to be certified and transmitted to the Society—are severally applicable to the Premiums for Horses. Evidence must be produced that the Prize Stallions have had produce. Mares must have foals at their feet, or be entered as being in foal; in the latter case, payment of the Premium will be deferred till certificate of birth.

ENTIRE COLTS.

DISTRICTS.

1. *The County of Stirling.*
2. *The County of Forfar.*
3. *The Island of Bute.*
4. *The District of Rhins in Wigtownshire.*
5. *The County of Caithness.*
6. *The County of Kincardine.*

Conveners of Committees.

First District—John Stirling of Kippendavie.
Second District—Sir John Ogilvy, Bart., M.P.
Third District—Thos. Gibson of Spittal, M.D.
Fourth District—George Guthrie, Rephad.
Fifth District—Alexander Henderson of Stemster.
Sixth District—Sir Thomas Gladstone, Bart.

Premiums.

1. For the best Entire Colt, for agricultural purposes, foaled after 1st January 1860, ... £6
2. For the best Entire Colt, for agricultural purposes, foaled after 1st January 1861, ... £4

Four lots in each Class will warrant the award of full, and two lots of half, premiums. The other regulations for Horses are generally applicable. These premiums are granted for two years.

In 1862.

Nos. 1, 2, 3, and 4, are in competition for the last year.
Nos. 5 and 6 for the first year.

SECTION 3. SHEEP.

The Premiums for Sheep are granted for three alternate years, under the same conditions as those for Cattle. See Note p. 31.

A Silver Medal, as in the case of Cattle, is allowed for the intermediate years.

1. LEICESTER BREED.

DISTRICTS.

1. *The District of the Melrose Farmers' Society.*
2. *The County of Forfar.*
3. *The District of the Perth, Fife, Kinross, and Clackmannan Association.*
4. *The County of Haddington.*

Conveners of Committees.

FIRST DISTRICT—Nicol Milne of Faldonside.
SECOND DISTRICT—Colonel Kinloch of Kilrie.
THIRD DISTRICT—Lord Kinnaird, K.T.
FOURTH DISTRICT—James W. Hunter of Thurston.

1. For the best Tup, belonging to a Proprietor or Factor—The Silver Medal.
2. For the best Tup of any age, ... £5
3. For the best two Shearling Tups, ... £5
4. For the best Pen of five Ewes, not less than two Shear, £5
5. For the best Pen of five Gimmers or Shearling Ewes, £4

The Money Premiums are restricted to Tenants and Proprietors farming the whole of their own lands.

In 1862.

No. 1 is in competition for an extra year.
Nos. 2 and 3 for the last year.
No. 4 for the second year.

2. CHEVIOT BREED.

DISTRICTS.

1. *The County of Selkirk.*
2. *The Islands of Islay, Jura, and Colonsay.*
3. *The District of the West Teviotdale Society.*
4. *The County of Peebles.*
5. *The Districts of Mull and Morven.*
6. *The Districts of Gairloch and Lochbroom.*
7. *The District of Nithsdale.*
8. *The District of Annandale.*
9. *The Districts of Eskdale and Liddesdale.*

Conveners of Committees.

FIRST DISTRICT—James Ballantyne of Holylee.
SECOND DISTRICT—Richard D. Campbell of Jura.
THIRD DISTRICT—Allan Eliott Lockhart of Borthwickbrae.
FOURTH DISTRICT—Sir Graham G. Montgomery, Bart.
FIFTH DISTRICT—Farquhar Campbell of Aros.
SIXTH DISTRICT—Sir Kenneth S. Mackenzie of Gairloch, Bart.
SEVENTH DISTRICT—Wm. Maxwell of Carruchan.
EIGHTH DISTRICT—John J. Hope Johnstone of Annandale, M.P.
NINTH DISTRICT—James Connell of Conheath.

1. For the best Tup, belonging to a Proprietor or Factor—The Silver Medal.
2. For the best Tup of any age, ... £5
3. For the best two Shearling Tups . . . £5
4. For the best Pen of five Ewes, not less than two Shear, £5
5. For the best Pen of five Gimmers or Shearling Ewes, £4

The Money Premiums are restricted to Tenants and Proprietors farming the whole of their own lands.

In 1862.

No. 1 is in competition for the last year.
No. 2 for the second year.
Nos. 3 and 4 for the first year.

Nos. 5, 6, 7, 8, and 9 compete for local Premiums.

3. BLACK-FACED BREED.

DISTRICTS.

1. *The County of Dumbarton.*
2. *The Districts of Badenoch and Rothiemurchus.*
3. *The Island of Arran.*
4. *The District of the Gatehouse Society.*
5. *The Upper Ward of Lanarkshire.*
6. *The District of Argyll.*

Conveners of Committees.

FIRST DISTRICT—Alexander Smollett of Bonhill.
SECOND DISTRICT—Cluny Macpherson.
THIRD DISTRICT—James Paterson, Whitehouse.
FOURTH DISTRICT—Walter M'Culloch of Ardwall.
FIFTH DISTRICT—John Ord Mackenzie of Dolphinton.
SIXTH DISTRICT—William Campbell of Ormsary.

1. For the best Tup, belonging to a Proprietor or Factor—The Silver Medal.
2. For the best Tup of any age, ... £5
3. For the best two Shearling Tups, ... £5
4. For the best Pen of five Ewes, not less than two Shear, £5
5. For the best Pen of five Gimmers or Shearling Ewes, £4

The Money Premiums are restricted to Tenants and Proprietors farming the whole of their own lands.

In 1862.

No. 1 is in competition for the last year.
No. 2 for the second year.

Nos. 3, 4, 5, and 6, compete for local Premiums.

RULES OF COMPETITION.

1. The Members of the Society in the several Districts are appointed Committees of Superintendence, as in Nos. 1 and 2 of the Regulations for Cattle Competitions, and they shall be convened by their respective Conveners in the manner and for the purposes specified in these regulations.

2. The Competition shall take place before the 1st of November, and the time and place must be publicly intimated by each Convener within his District.

3. Tups shall have served the usual number of Ewes for at least three weeks during the previous season. All prize Tups must serve within the District. The Competitions are open to Tups not belonging to the District, provided they are left for service. Ewes must have reared Lambs during the season. Ewes and Gimmers must be taken from regular breeding hirsels.

4. The Premiums shall not be divided. No Money Premiums shall be adjudged unless there are three lots exhibited, and only one-half if there are not six lots. Each Competitor may show two lots. For the Medal two lots authorise an award. The other Regulations for Cattle Competitions,—in regard to the date of Entry—the placing of Stock—the exclusion of Animals which have gained premiums at previous Shows—the right of a Tenant, under certain circumstances, to compete for the Medal—reporting false entries—the Regulation as to expenses—the period within which Premiums must be applied for—and the manner in which the Reports must be certified and transmitted,—are applicable to the Premiums for Sheep.

5. The Society gives these Premiums for three alternate years in each District, if during the intervening years premiums are awarded by the District to an amount not less than one-half of the Society's Premiums, and for the same description of the Stock. Reports of these intermediate Competitions must be lodged by the 1st of November, or the Society's grant shall terminate.

6. Blank Reports will be furnished to the Conveners of Districts. These must be accurately filled up in all details, signed by the Convener, and transmitted to the Secretary by the 1st of November.

4. SHEARING SHEEP.

The Silver Medal will be given to the best Sheep-shearer in each of the Districts in which the Premiums for sheep are in operation.

CONDITIONS.

1. Money Premiums must be awarded by the District at each Competition, to the amount of not less than £2.

2. The District Convener will fix the time and place of Competition, and make all necessary arrangements.

3. The Medal shall not be awarded unless there are three Competitors, and it shall always accompany the highest Money Premium. If two or more lots appear to be equally well executed, preference should be given to that executed within the shortest time.

4. The Conveners shall report the particulars of the Competition and the award of the Judges to the Society, along with the Report of the Sheep Premiums in the District.

SECTION 4. SWINE.

DISTRICTS.

1. *The District of the Moffat Society.*
2. *The District of the Jedburgh Society.*

Conveners of Committees.

FIRST DISTRICT—J. J. Hope Johnstone, M.P.
SECOND DISTRICT—John Ord of Muirhouselaw.

1. For the best Boar belonging to a Proprietor or Factor.—The Silver Medal.
2. For the best Boar, ... £4
3. For the second best, ... £2
4. For the best Breeding Sow, ... £3
5. For the second best, ... £1

The Money Premiums are restricted to Tenants and Proprietors farming the whole of their own lands.

The above Premiums are given to each District for three consecutive years.

In 1862.

Nos. 1 and 2 are in competition for the second year.

The Regulations for Cattle Competition are generally to be held as applicable to the Premiums for Swine; and the Convener and Committee of the Society's Members in the District are accordingly referred to them.

Four lots in each Class will warrant the award of full, and two lots of half Premiums. There must be at least two Competitors for the Medal.

Blank Reports, and Returns of Competitions, will be furnished to the Conveners of Districts. These must be accurately filled up in all details, signed by the Convener, and transmitted to the Secretary by the 1st of November.

CLASS III.

DAIRY PRODUCE.

DISTRICTS.

1. *The District of Kintyre.*
2. *The County of Wigtown.*
3. *The County of Ayr.*
4. *The District of Nithsdale.*

Conveners of Commitees.

FIRST DISTRICT—John Lorn Stewart of Coll.
SECOND DISTRICT—David Guthrie, Stranraer.
THIRD DISTRICT—Sir James Fergusson, Bart., M.P.
FOURTH DISTRICT—William Maxwell of Carruchan.

1. BUTTER.

1. For the best sample of Cured Butter (not less than 14 lbs.) belonging to a Proprietor or Factor—The Silver Medal.
2. For the best sample of Cured Butter (not less than 14 lbs.) belonging to a Tenant, or Proprietor farming the whole of his own lands, ... £3
3. For the second best, ... £2

2. CHEESE.

4. For the best couple of Sweet-Milk Cheeses belonging to a Proprietor or Factor—The Silver Medal.
5. For the best couple of Sweet-Milk Cheeses belonging to a Tenant, or Proprietor farming the whole of his own lands, £3
6. For the second best, ... £2

The above Premiums are given to each District for three consecutive years.

In 1862.

No. 1 is in competition for the last year.
Nos. 2, 3, and 4 for the second year.

CONDITIONS.

1. The Members of the Society, resident within the Districts, are appointed Committees of Superintendence, for the purposes expressed in the Regulations for Cattle Competitions.

2. Eight lots in any one Class will warrant an award of full, and four lots of half Premiums. There must be at least two Competitors for the Medal.

3. Competitors must certify that the Butter and Cheese exhibited by them are average specimens of the produce of their Dairies in 1862; and that the quantity produced during the season has not been less than 1 cwt. of Butter, or 2 cwt. of Cheese. The Committee shall fix such general regulations as they may consider proper—and, in particular, the time and place of competition. In the event of two or more competing lots being deemed equal in quality, the Premium shall be awarded to the Competitor who has made the larger quantity. The successful Competitors, before receiving the Premiums, are required to transmit to the Secretary a detailed Report of the whole process followed by them in the manufacture of their Butter or Cheese.

4. Reports of the award of the Premiums to be lodged with the Secretary on or before the 1st November 1862.

CLASS IV.

CROPS AND CULTURE.

I.—SEEDS.

The Society, with a view of aiding Local Associations, gives the Silver Medal to the grower of the best Seeds for which Premiums in money shall have been awarded in the following districts:—

1. County of INVERNESS: Convener, Arthur Forbes of Culloden.
   1. Any variety of Wheat.
   2. Any variety of Barley.
   3. Any variety of Oats.
   4. Perennial Rye Grass.

2. County of FIFE: Convener, Alex. Bethune of Blebo.
   1. Any variety of Wheat.
   2. Any variety of Barley.
   3. Any variety of Oats.
   4. Perennial Rye Grass.

3. County of WIGTOWN: Convener, Viscount Dalrymple.
   1. Any variety of Wheat.
   2. Any variety of Barley.
   3. Any variety of Oats.
   4. Perennial Rye Grass.

4. County of AYR: Convener, Sir James Fergusson, Bart., M.P.
   1. Any variety of Wheat.
   2. Any variety of Barley.
   3. Any variety of Oats.
   4. Perennial Rye Grass.

5. County of FORFAR: Convener, Sir John Ogilvy, Bart., M.P.
   1. Any variety of Wheat.
   2. Any variety of Barley.
   3. Any variety of Oats.
   4. Perennial Rye Grass.

6. County of STIRLING: Convener, John Stirling of Kippendavie.
   1. Any variety of Wheat.
   2. Any variety of Barley.
   3. Any variety of Oats.
   4. Any variety of Beans.
   5. Tares.

7. District of WESTER ROSS: Convener, Keith W. Stewart Mackenzie of Seaforth.
   1. Any variety of Wheat.
   2. Any variety of Barley.
   3. Any variety of Oats.
   4. Perennial Rye Grass.

8. District of the BLACK ISLE SOCIETY: Convener, Sir J. J. R. Mackenzie, Bart.
   1. Any variety of Barley.
   2. Any variety of Oats.

CONDITIONS.

1. In each District the Convener shall fix the time and place of Competition, appoint the Judges, and make all other necessary arrangements, in concurrence with the other Members of the Society, and the local Association of the District. Conveners will be furnished with blank Schedules for reporting the awards.

2. The quantity shown in Competition by each Grower must not be less than three quarters of each variety of Grain, or two quarters of Beans or Grass Seeds. To authorise the award of the Medal, there must at least be two Competitors. The first Premium awarded by the District shall not be less than £1 for each kind of grain for which a Medal is claimed.

3. The Judges shall be guided in their awards—*1st*, By the purity of the Seed; *2d*, By its freeness from extraneous seeds; and *3d*, Where there is an equality in these respects, by the weight.

4. Successful Competitors must immediately transmit, free of expense, two quarts of each kind of seed, addressed to the Secretary at the Society's Museum, George IV. Bridge, Edinburgh.

5. The Returns must show, as accurately as possible, the produce per imperial acre, also the altitude, exposure, and nature of the soil on which the crops were raised, together with the dates of sowing and reaping, and the weight per bushel. The varieties for which Premiums have been given must be named. Reports of the several Competitions must be lodged by the 1st of November.

6. The Medals will be continued in each District for five consecutive years. Applications from other Districts must be lodged with the Secretary of the Society by 1st November next.

2. PLOUGHING COMPETITIONS.

The Silver Medal will be given to the winner of the first Premium at Ploughing Competitions, where there are fifteen Ploughs and Premiums to the amount of Three Sovereigns, provided a Report in the following terms is made to the Secretary, within one month of the Competition, by a Member of the Society, and the undernoted conditions have been observed:—

FORM OF REPORT.

I   of   Member of the Highland and Agricultural Society, hereby certify, that I attended the Ploughing Match of the   Association at   in the County of   on the   when   ploughs competed;   of land was assigned to each, and   hours were allowed for the execution of the work. The sum of £   was awarded in the following proportions, viz.:—

[Here enumerate the names and designations of successful Competitors.]

CONDITIONS.

1. All Matches must be at the instance of a local Society or Ploughing Association, and no Match at the instance of an individual will be recognised.

2. The title of such Society or Association, together with the name and address of its Secretary, must be registered with the Secretary of the Highland and Agricultural Society, No. 6 Albyn Place, Edinburgh.

3. Not more than one Match, in the same season, can take place within the bounds of the same Society or Association.

4. All Reports must be lodged within one month of the date of the Match, and certified by a Member of the Society who was present at it.

5. A Member can only report one Match, and a Ploughman can only carry one Medal, in the same season.

6. To warrant the Medal, there must have been fifteen Ploughs in Competition, and Three Pounds awarded in Premiums.

7. Ploughmen shall not be allowed any assistance, and their work must not be set up nor touched by others; on land of average tenacity, the ploughing

should be at the rate of an imperial acre in ten hours, and attention should be given to the sufficiency of the work below, as well as to its neatness above the surface.

3. REAPING MACHINES.

The Silver Medal will be given to the Servant found most expert at a trial of Reaping Machines, when not fewer than four were in operation, and Premiums to the amount of Two Sovereigns were awarded. Reports must be lodged with the Secretary by a Member who has inspected the work, not later than the 1st of November.

4. MEDALS IN AID OF PREMIUMS GIVEN BY LOCAL SOCIETIES.

The Society being anxious to co-operate with local Associations, will give a limited number of Silver Medals annually, in addition to the Money Premiums awarded in the district:—

1. STOCK.—To local Societies not on the list of District Competitions, awarding Premiums for Stock to the amount of £10, and reporting their Shows to the Secretary—The Silver Medal for the best Male and for the best Female animal of any Pure Breed.

   Applied for by the Forbes and Fordyce Association—Convener, Sir John Stuart Forbes of Pitsligo, Bart.

   Western District of Mid-Lothian Association—Convener, Peter M'Lagan of Pumpherston.

   Penicuik Society—Convener, The Right Hon. Sir George Clerk, Bart.

   District of Breadalbane and Weem—Convener, James F. Wyllie, Bolfracks.

   Buchan Society—Convener, George Baird of Strichen.

   Wester Ross Club—Convener, Keith W. Stewart Mackenzie of Seaforth.

   Avondale Society—Convener, J. P. Alston of Muirburn.

   Dalbeattie Society—Convener, Wellwood H. Maxwell of Munches.

   Black Isle Society—Convener, Sir J. J. R. Mackenzie, Bart.

   Fettercairn Club—Convener, Major MacInroy of the Burn.

   Mauchline Society—Convener, C. V. H. Campbell of Netherplace.

2. For the best managed FARM—The Silver Medal.

   Applied for by the Nairnshire Society—Convener, Wm. Alexander Stables, Cawdor Castle.

   Inverness Society—Convener, Arthur Forbes of Culloden.

Kincardineshire Club—Convener, Sir John S. Forbes, Bart.
Mauchline Society—Convener, C. V. H. Campbell of Netherplace.

3. For the best managed DAIRY—The Silver Medal.

Applied for by the Mauchline Society—Convener, Colonel Ferrier Hamilton.

4. For the best managed GREEN CROP—The Silver Medal.

Applied for by the Bute Society—Convener, Thomas Gibson of Spittal.
Inverness Society—Convener, Arthur Forbes of Culloden.
District of Breadalbane—Convener, James F. Wyllie, Bolfracks.
Leochel-Cushnie Society—Convener, Arthur Forbes Gordon of Rayne, W.S.
Clackmannan Society—Convener, James Johnstone of Alva.
Fettercairn Club—Convener, Major MacInroy of the Burn.
Mauchline Society—Convener, C. V. H. Campbell of Netherplace.
Kincardineshire Club—Convener, Sir John S. Forbes, Bart.

5. For the best managed HAY CROP—The Silver Medal.

Applied for by the Clackmannanshire Society—Convener, James Johnstone of Alva.

6. For the best kept FENCES—The Silver Medal.

No Application.

7. For the best managed DUNGHILL—The Silver Medal.

Applied for by the district of Breadalbane—Convener, James F. Wyllie, Bolfracks.

8. To the Labourer most expert and efficient in opening and filling Drains, and otherwise executing the works necessary in thorough Draining—The Silver Medal.

No Application.

9. To the most expert Hedge-cutter—The Silver Medal.

No Application.

The Medals to be issued will be limited to ten in each class, except No. 1.
The money Premiums given in the District must be £2 in each case, and in No 1, £10.
Reports of the several Competitions, and applications for Medals in 1863 must be lodged by 1st November next.

CLASS V.

COTTAGES AND GARDENS.

The following Premiums are offered for competition in the Parishes after mentioned. The Medals and one-half of the Premiums are given by the Society, and the other half is contributed by the respective Parishes.

COTTAGES.

1. For the best kept Cottage in each Parish—One Pound Five Shillings; and where there are four competitors—The Silver Medal.
2. For the second best—One Pound.
3. For the third best—Fifteen Shillings.

GARDENS.

1. For the best kept Cottage Garden in each Parish—One Pound Five Shillings; and where there are four competitors—The Silver Medal.
2. For the second best—One Pound.
3. For the third best—Fifteen Shillings.

Aberdeenshire.

LEOCHEL-CUSHNIE—Convener, Arthur Forbes Gordon of Rayne.
STRICHEN—Convener, George Baird of Strichen.

Fifeshire.

FALKLAND—Convener, Francis Howden, Falkland.
NEWBURGH and ABDIE—Convener, Dr Lyell, Newburgh.

Stewartry of Kirkcudbright.

URR—Convener, Wellwood H. Maxwell of Munches.

Lanarkshire.

LAMINGTON—Convener, Alexander Baillie Cochrane of Lamington, M.P.
LESMAHAGOW—Convener, W. E. Hope Vere of Blackwood.
COVINGTON—Convener, Sir Wyndham Carmichael Anstruther, Bart.

Perthshire.

St Martins—Convener, William Macdonald Macdonald of St Martins.

Roxburghshire.

Ancrum—Convener, Sir William Scott of Ancrum, Bart., M.P.

Wigtownshire.

Kirkcolm—Convener, David Guthrie, Stranraer.
Leswalt—Convener, Sir Andrew Agnew of Lochnaw, Bart., M.P.
Port-Patrick—Convener, Sir Edward Hunter Blair, Bart.
Old Luce—Convener, Sir John C. Dalrymple Hay of Park Place, Bart.

CONDITIONS.

1. Competitions may take place in the different Parishes for Cottages and Gardens, or for either separately.

2. In either case, the occupiers of Gentlemen's Lodges and Gardeners' Houses are excluded, as well as Gentlemen's Servants occupying Cottages in the Policies, or on land in the natural possession of their masters. The inspection must be completed by the 1st of October. In making the inspection, the Conveners may take the assistance of any competent judge.

3. The annual value of each Cottage, with the ground occupied in the parish by a Competitor, shall not exceed £5 sterling. A Competitor who has gained a Premium in a previous year cannot compete again for the same or a lower Premium.

4. If the Cottage is occupied by the proprietor, the roof must be in good repair; if the roof is of thatch, it must be in good repair, though in the occupation of a tenant. The interior and the external conveniences must be clean and orderly—the windows must be free of broken glass, clean, and affording the means of ventilation. Dunghills, and all other nuisances, must be removed from the front and gables. In awarding the Cottage Premiums, preference will be given to Competitors who, in addition to the above requisites, have displayed the greatest taste in ornamenting the exterior of their houses, and the ground in front and at the gables.

5. In estimating the claims for the Garden Premiums, the Judges should have in view—the sufficiency and neatness of the fences; the cleanness of the ground, and neatness of the walks; the quality of the crops, and general productiveness of the garden; and the choice of crops.

6. Reports, stating the number of Competitors, the names of successful parties, and the nature of the exertions which have been made by them, must be transmitted by the Conveners to the Secretary on or before 1st of November next.

Parishes desirous of these Premiums must lodge applications with the Secretary on or before the 1st November next.

MEDALS FOR COTTAGES OR GARDENS.

The Society will issue annually twelve Medals to local Associations or individuals, who at their own expense establish Premiums for Cottages or Gardens.

The Medals will be issued upon a Report by a Member of the Society, in the terms required by the preceding conditions, describing the merits of the Cottages or Gardens. The Reports to be lodged with the Secretary on or before the 15th October 1862.

Applied for by The Linlithgow Society.
Lord Kinnaird.
Mrs Douglas Baird of Closeburn.
Lanark Horticultural Society.
Eastern District of Stirling.
The Proprietors of Lundin.
The Parishes of Forglen and Alvah.
Mauchline Horticultural Society.
The Newburgh Gardening Society.
The Conan and Maryburgh Gardening Society.
United East Lothian Society.
Arthur Forbes Gordon of Rayne.

IMPROVING EXISTING COTTAGES.

To the Proprietor in Scotland who shall report the Improvement of the greatest number of Cottages in the years 1859, 1860, and 1861—The Gold Medal.

BUILDING NEW COTTAGES.

To the Proprietor in Scotland who shall report the Erection of the greatest number of approved Cottages during the years 1858, 1859, 1860, and 1861—The Gold Medal.

CONDITIONS.

1. Claims for the above Premiums must be lodged with the Secretary on or before the 1st of October next, to allow an inspection to be made of the different Cottages. The inspection will be conducted by a Committee of the Society's Members, and Reports must be transmitted to the Secretary on or before the 1st November.

2. The annual value of the Cottage or Cottages separately, with the garden ground, must not exceed £5.

3. In estimating the claims of Competitors, the following points will be kept in view:—The external appearance of the Cottages; their internal accommodation; the arrangements of the outhouses; the means of drainage and ventilation; and the expense of the building or of the alteration, compared with its durability and accommodation. When the Cottages of one Competitor are superior in style and comfort to those of another, though not so numerous, the Inspectors will give them the preference, provided they amount at least to three, and have been erected at a moderate expense.

4. Parties competing will forward to the Society Plans, Specifications, and Estimates, of which, and of all information sent therewith, copies may be taken for publication, if the Society shall see fit, and the originals returned to the parties within six months, if desired.

ACCOMMODATION FOR FARM-SERVANTS.

To the Proprietor in Scotland who shall have Erected on his estate the most approved Farm-buildings in reference to the proper accommodation of Farm-servants—The Gold Medal.

Reports, Plans, and Specifications to be lodged by the 1st November 1862.

INTERNATIONAL SHOW.

The SOCIETY has resolved, in connexion with the ROYAL AGRICULTURAL SOCIETY of ENGLAND, to offer the following PREMIUMS in MONEY and SILVER MEDALS for SCOTTISH STOCK at the INTERNATIONAL SHOW, to be held in BATTERSEA PARK, LONDON, in the Week commencing MONDAY, 23d June 1862:—

CLASS I.—CATTLE.

POLLED (ANGUS AND ABERDEEN).

SECTION		
1	Best Bull calved before 1st Jan. 1860,	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Silver Medal.
2	Best Bull calved after 1st Jan. 1860,	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Silver Medal.
3	Best Bull calved after 1st Jan. 1861,	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.
4	Best Cow of any age, ...	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.
5	Best Heifer calved after 1st Jan. 1860,	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.
6	Best Heifer calved after 1st. Jan. 1861,	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Silver Medal.

POLLED (GALLOWAY).

7	Best Bull calved before 1st Jan. 1860,	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Silver Medal.
8	Best Bull calved after 1st Jan. 1860,	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Silver Medal.
9	Best Bull calved after 1st Jan. 1861,	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.

Section		
10	Best Cow of any age, ...	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.
11	Best Heifer calved after 1st Jan. 1860,	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.
12	Best Heifer calved after 1st Jan. 1861,	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Silver Medal.

HIGHLAND.

13	Best Bull calved before 1st Jan. 1859,	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Silver Medal.
14	Best Bull calved after 1st Jan. 1859,	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Silver Medal.
15	Best Bull calved after 1st Jan. 1860.	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.
16	Best Cow of any age, ...	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.
17	Best Heifer calved after 1st Jan. 1859,	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.
18	Best Heifer calved after 1st Jan. 1860,	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Silver Medal.

AYRSHIRE.

19	Best Bull calved before 1st Jan. 1860,	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Silver Medal.
20	Best Bull calved after 1st Jan. 1860,	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Silver Medal.
21	Best Bull calved after 1st Jan. 1861,	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.
22	Best Cow in milk of any age, . . .	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.

Section		
23	Best Cow in calf of any age, ...	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.
24	Best Heifer calved after 1st Jan. 1860,	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.
25	Best Heifer calved after 1st Jan. 1861,	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Silver Medal.

CLASS II.—CLYDESDALE HORSES.

Section		
1	Best Stallion foaled before 1st Jan. 1859, ...	Thirty Sovereigns.
	Second best, ...	Fifteen Sovereigns.
	Third best, ...	The Silver Medal.
2	Best Entire Colt foaled after 1st Jan. 1859, ...	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Silver Medal.
3	Best Mare (with Foal at foot) foaled before 1st Jan. 1859, ...	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Silver Medal.
4	Best Mare (in foal) foaled before 1st Jan. 1859, ...	Sixteen Sovereigns.
	Second best, ...	Eight Sovereigns.
	Third best, ...	The Silver Medal.
5	Best Filly foaled after 1st Jan. 1859,	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.

CLASS III.—SHEEP.

BLACKFACED.

Section		
1	Best Tup not more than four shear, .	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.
2	Best Shearling Tup, ...	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.
3	Best five Ewes, not more than four shear, ...	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Silver Medal.

Section		
4	Best five Shearling Ewes, ...	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Silver Medal.

CHEVIOT.

5	Best Tup, not more than four shear, .	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.
6	Best Shearling Tup, ...	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Silver Medal.
7	Best five Ewes, not more than four shear, ...	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Silver Medal.
8	Best five Shearling Ewes, ...	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Silver Medal.

The usual disqualification of Animals which have gained the Society's First Prizes is not applicable on this occasion.

CERTIFICATES of ENTRY must be lodged with Mr HALL MAXWELL, No. 6 Albyn Place, Edinburgh, ON OR BEFORE THE 1ST OF MAY.

MEMBERS of the SOCIETY are entitled to enter Stock on the same terms as Members of the Royal Agricultural Society of England—viz., Five Shillings for each lot. Non-members will pay Fifteen Shillings. Payment must accompany the Certificate of Entry.

The SHOW YARD will be opened for Stock on MONDAY 23D, and on TUESDAY, 24TH JUNE, but Animals from Scotland will be admitted earlier if desired by the Exhibitor.

STOCK must remain in the Yard until 6 P.M. on WEDNESDAY, 2D July.

FORAGE for STOCK during the Show is provided in the YARD free of charge.

MEMBERS of the SOCIETY will be entitled to free admission to the YARD on production of Members' Tickets, which must be applied for at the Society's Chambers, No. 6 Albyn Place, on or before 15th June.

FORMS of CERTIFICATE and COPIES of the DETAILED REGULATIONS to be had by applying at 6 ALBYN PLACE, Edinburgh.

The English and Scottish Railway Companies will return Stock free when unsold.

AGRICULTURAL MEETING,

AND

GENERAL SHOW OF STOCK AND IMPLEMENTS,

At KELSO, in 1863.

The District connected with the Show will comprise the Counties of BERWICK, ROXBURGH, and SELKIRK.

CATTLE.

Premiums in Money will be offered for the following Classes :—

SHORT-HORN.

Bulls calved before 1st January.............1861
Bulls calved after 1st January..............1861
Bulls calved after 1st January...............1862
Cows of any age.
Heifers calved after 1st January.............1861
Heifers calved after 1st January............1862

POLLED.

Bulls calved before 1st January..............1861
Bulls calved after 1st January...............1861
Bulls calved after 1st January...............1862
Cows of any age.
Heifers calved after 1st January.............1861
Heifers calved after 1st January............1862

Note.—When the number of Galloways exceeds Three in any Section, they shall be judged separately from Polled Angus and Aberdeen.

AYRSHIRE.

Bulls calved before 1st January............1861.
Bulls calved after 1st January..............1861.
Cows in Milk of any age.
Cows in Calf of any age.
Heifers calved after 1st January............1861.
Heifers calved after 1st January...........1862.

HIGHLAND.

Bulls calved before 1st January............1860.
Bulls calved after 1st January...... ......1860.
Cows of any age.
Heifers calved after 1st January...........1860.
Heifers calved after 1st January..........1861.

EXTRA STOCK.

Medals will be offered for the following Extra Classes of Cattle.

Oxen of any pure or cross breed calved after 1st January 1860
Oxen of any pure or cross breed calved after 1st January 1861
Oxen of any pure or cross breed calved after 1st January 1862
Highland Oxen calved after 1st January........................1859
Highland Oxen calved after 1st January........................1860
Cross-bred Heifers calved after 1st January....................1861
Cross-bred Heifers calved after 1st January......... 1862

HORSES

For Agricultural Purposes.

Stallions foaled before 1st January....................1860
Entire Colts foaled after 1st January..................1860
Entire Colts foaled after 1st January..................1861
Entire Colts foaled after 1st January..................1862
Mares with foal at foot, foaled before 1st January 1860
Mares in foal, foaled before 1st January.............1860
Fillies foaled after 1st January.........................1860
Fillies foaled after 1st January.........................1861
Fillies foaled after 1st January.........................1862

SHEEP.

LEICESTER.

Tups not more than four shear.
Dinmont or Shearling Tups.
Ewes not more than four shear.
Shearling Ewes or Gimmers.

CHEVIOT.

Tups not more than four shear.
Dinmont or Shearling Tups.
Ewes not more than four shear.
Shearling Ewes or Gimmers.

BLACKFACED.

Tups not more than four shear.
Dinmont or Shearling Tups.
Ewes not more than four shear.
Shearling Ewes or Gimmers.

SOUTHDOWN.

Tups not more than four shear.
Dinmont or Shearling Tups.
Ewes not more than four shear.
Shearling Ewes or Gimmers.

FAT STOCK.

Shearling Wethers of any Cross.

NOTE.—*Ewes, Gimmers, and Wethers, to be exhibited in pens of five.*

SWINE.

Boars, large breed.	Sows, large breed.
Boars, small breed.	Sows, small breed.

Pigs not exceeding 8 months old, large breed.
Pigs not exceeding 8 months old, small breed.

POULTRY.

Cock and 2 Hens, Cockerel and 2 Pullets, of each of the following Breeds :—

Coloured Dorking.	Game.
White Dorking.	Any other Distinct Breed.
Coloured Cochin-China.	Bantams.
White Cochin-China.	White Aylesbury Ducks.
Brahmapootra.	Rouen Ducks.
Malay.	Any other breed.
Spanish.	Black Norfolk Turkeys.
Golden Hamburg.	Turkeys, any other breed.
Silver Hamburg.	Geese.
Polish.	Capons, 3 of any breed.

AGRICULTURAL EDUCATION.

The following By-Laws have been enacted under the authority of the Supplementary Charter of 1856, and in terms of the Report by the Council on Education thereby created:—

1. That in terms of a Report by the Council on Education, the following Board of Examiners be appointed:—

Science and Practice of Agriculture—Mechanics and Agriculture of the Farm—Professor JOHN WILSON; GEORGE HOPE, Fenton Barns; ROBERT RUSSELL, Pilmuir; and JOHN WILSON, Edington Mains.
Botany—Professor BALFOUR.
Chemistry—Professor THOMAS ANDERSON.
Natural History—Professor ALLMAN.
Veterinary Surgery—Professor DICK.
Field Engineering and Surveying—JOHN MILLER of Leithen, C.E., and JAMES STIRLING, C.E.
Book-keeping and Accounts—KENNETH MACKENZIE, Accountant, and PETER M'LAGAN of Pumpherston.

2. That it shall be competent for said Board from time to time to receive for examination, and to recommend for the Society's Agricultural Diploma, Candidates who shall have attained their 21st year, and who shall exhibit the vouchers, and pass an examination on the subjects hereinafter prescribed.

3. That the vouchers to be exhibited shall be such as to afford satisfactory evidence to the Board: *1st*, That the Candidate has attended a farm, and been engaged in the practical operations thereof, for a period of two years, or for two separate periods of not less than one year each. *2dly*, That the Candidate has attended, for another period of two years, or for separate periods of not less than one year each, the following Classes in some seminary recognised by the Board as sufficient:—Agriculture, Chemistry, Natural History, Botany, Veterinary Medicine, and Surgery.

4. That the Candidate's knowledge of practical husbandry, and of the foregoing branches of study, as well as of Field Engineering and Surveying, Farm Mechanics and Architecture, and Book-keeping, shall be established to the satisfaction of the Board by means of a strict examination.

5. That upon a report made by the Board to the Council on Education, stating that a Candidate has exhibited the vouchers

and passed the examination required, the Council shall issue, in favour of such Candidate, a diploma, bearing the corporate seal of the Society, and certifying his proficiency in the arts and sciences connected with agriculture.

VETERINARY COLLEGE.

This establishment is conducted by Professor Dick, assisted by Dr Allen Dalzell, Dr Young, Mr Strangeways, and Mr Worthington. The curriculum embraces the Principles and Practice of Veterinary Medicine and Surgery, with Anatomy, Physiology, and Demonstrations; Chemistry; Materia Medica and Dietetics; and the general management of domesticated Animals.

Students have the advantage of assisting in an extensive practice, and of performing the different operations which most frequently occur.

Attendance on Two Courses is required before a Student is taken upon trial for diploma; the examinations are conducted by leading members of the Medical Faculty, and of the Veterinary Profession; Graduates of the College are eligible for appointment as Veterinary Surgeons in Her Majesty's Service.

MUSEUM.

The Museum, George IV. Bridge, is open from eleven till four o'clock every day, except Monday. The public are admitted on inscribing their names in the Visitor's Book. Persons desirous of preserving objects illustrative of the Vegetable products of the country are invited to transmit them to the Secretary.

CHEMICAL DEPARTMENT.

The objects of the Chemical Department are twofold:—

I. The prosecution of Researches in various subjects connected with Agricultural Chemistry, the results of which are published at intervals in the Transactions.

Dr Anderson will be glad at all times to receive suggestions from Members of the Society regarding subjects they may consider worthy of investigation, and which will be laid before the Chemical Committee.

II. The performance of Analyses of Manures, Soils, Vegetable Products, &c., for Members of the Society, at reduced fees.

In purchasing manures, cattle foods, &c., Members are recommended, in all cases, to do so by guaranteed analysis, and to ascertain that the article delivered corresponds with it. Partial analyses, such as Nos. 6 and 7 of the accompanying List, will generally suffice to check the correspondence of the stock with the guarantee, and give an *approximate*, though not a precise estimate of its value. When an *exact* estimate is required, a complete analysis is necessary.

Samples intended for analysis should be sent (carriage paid) addressed to Dr ANDERSON, 15 SHUTTLE STREET, GLASGOW; and when of small size, they are most cheaply and expeditiously forwarded *by post*. They should be distinctly labelled, marked with the name and address of the sender in full; and accompanied by a letter, specifying the particular analysis required, according to its number in the following List,—and, if possible, the object in view,—as, by doing so, much trouble and delay will occasionally be saved.

Much inconvenience having been experienced by persons sending samples for Analysis which had not been selected with sufficient care, and were afterwards found not to represent the average composition of the substance, it is particularly requested that the following instructions may be attended to as closely as circumstances will permit:—

INSTRUCTIONS FOR SELECTING SAMPLES FOR ANALYSIS.

Manures.—A large double handful of the Manure should be taken from each of *at least* five or six different bags; and if any lumps are found in it, a due proportion of these should also be

taken. The whole being laid on a large sheet of paper, should be carefully mixed by rubbing with the hand, the lumps being broken down and mixed as uniformly as possible with the powdery part. If this mixture be carefully made, a quantity of it not exceeding *two ounces* will suffice for the analysis. It should be folded up in tinfoil, to prevent its becoming dry, and is most cheaply and expeditiously forwarded by post. In default of tinfoil, the sample may be wrapped in double folds of strong writing-paper. Should the manure contain stones, or be very moist, or should any difficulty be experienced in making a uniform mixture, it is desirable that *two or three pounds* should be sent.

Soils.—In selecting Soils for analysis, five or six spadefuls should be taken from different parts of the field, and, after being spread out in a thin layer for several days to dry, should be put two or three times through a fine sieve, so as to insure uniform mixture. For a complete analysis, not less than *two pounds* should be sent; for a partial analysis, three or four ounces will be sufficient.

Waters.—For the complete analysis of a Water, from *two to three gallons* are required; for the determination of the amount of salts in solution, and lime thrown down by boiling, *two quarts* will suffice. A well-water may be selected at any time; but the water of a spring or running stream should be taken in dry weather. The jars or bottles in which they are sent must be tightly corked and sealed. In the analysis of a mineral water, it may sometimes be desirable to determine the amount of gases held in solution; in which case certain precautions must be observed which require the presence of a chemist at the spring.

Limestones, Clays, Ironstones, &c.—If the bed of any of these substances of which the analysis is required be very uniform in appearance, a piece of two or three ounces weight, taken from any part of it, will be enough for analysis; but in all cases it is better to send three or four chips from different parts of its thickness. Sometimes, where the characters of different parts of the bed vary much, separate analyses of these portions may be requisite, in which case two ounces of each may be sent.

The following are the rates at which Analyses, &c., are furnished to *Members of the Society*, and it is requested that the fee be remitted along with the sample:—

1. Complete analysis of a Soil, including determination of Alkalies and Phosphates, £3.
2. A partial analysis of a Soil, such as the determination of the quantity of Organic Matter, and relative proportion of Clay, Sand, and Carbonate of Lime it contains, 10s.
3. Quantitative determination of any one ingredient of a Soil, 7s. 6d.

4. Complete analysis of Saline Manures and other substances, such as Gypsum, Nitrates of Soda and Potash, Ammoniacal Salts, Guano, Oilcake, Bone-dust, Rape-dust, Superphosphate of Lime, £1.
5. Testing the above substances for adulterations,—for each sample, 5s.

   This examination is generally sufficient to determine whether or not any of these substances are grossly adulterated, but it gives no idea of the comparative value of different Samples, where all are genuine.
6. Determination of the percentage of Phosphates and Ammonia in a Guano, 10s.
7. Determining the quantity of Soluble and Insoluble Phosphates in a Superphosphate, 10s.

   This and the preceding determination generally suffice to show whether the sample is of fair quality, and corresponds with the analysis by which it was sold, but not to fix its exact commercial value.
8. Complete analysis of Limestones, Marls, Shell-sands, &c., £1.
9. Examining any of the above substances for the quantity of Lime, and ascertaining in the same the presence of Magnesia and Alumina, 7s. 6d.

   Ascertaining the proportion of these, 2s. 6d. additional for each substance.
10. Complete analysis of the Ashes of any Plant, £3.
11. Complete analysis of a Water, £2.
12. Determination of the amount of Salts in solution, and of the Lime thrown down by boiling in any water, 10s.
13. Analysis of Tile or Fire Clay, £1, 10s.
14. Complete analysis of Roots, Grains, and other Vegetable Products, £1.
15. Examining products of Vegetation, or of the Dairy, such as Nutritive Matters in Wheat, or other grain—quantity of Butter or Cheese in Milk—5s. for each ingredient.
16. Determination of the quantity of Nitrogen in any substance, 7s. 6d.
17. Answers to letters asking advice on subjects within the department of the Chemist, 5s.

The charges for other Analyses not specified in the list will be settled by the Committee of Management, with reference to the amount of work which they involve, and on a scale similar to the above.

J[N]. HALL MAXWELL, *Secretary.*

EDINBURGH, 6 ALBYN PLACE,
15th February 1862.

PREMIUMS

OFFERED BY

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

IN

1863.

CONTENTS.

PRELIMINARY NOTICE.

When the Highland Society was instituted in the year 1784, and established by Royal Charter in 1787, its operation was limited to matters connected with the improvement of the Highlands of Scotland; but the supervision of certain departments, proper to that part of the country, having been subsequently committed to special Boards of Management, several of the earlier objects contemplated by the Society were abandoned, while the progress of Agriculture led to the adoption of others of a more general character. The exertions of the Society were thus early extended to the whole of Scotland, and have, for three-quarters of a century, been directed to the promotion of the science and practice of Agriculture in all its branches.

In accordance with this more enlarged sphere of action, the original title of the Society was altered, under a Royal Charter in 1834, to The Highland and Agricultural Society of Scotland.

The leading purposes of the Institution are set forth in the following pages, where it will be found that Premiums are awarded for Reports on almost every subject connected with the cultivation of the soil; the rearing and feeding of stock; the management of the dairy; the growth of timber; the extension of cottage accommodation; the improvement of agricultural machinery and implements; the application of chemical science; and the dissemination of veterinary information.

Among the more important measures which have been effected by the Society, are—

I. Agricultural Meetings and General Shows of Stock, Implements, &c., held in the principal Towns of Scotland, at which

exhibitors from all parts of the United Kingdom are allowed to compete.

2. A System of District Shows, instituted for the purposes of improving the breeds of Stock most suitable for different parts of the country, and of aiding and directing the efforts of local Agricultural Associations.

3. The encouragement and promotion of a proper system of Agricultural Education, under powers conferred by a Supplementary Royal Charter, authorising "The COUNCIL of the HIGHLAND AND AGRICULTURAL SOCIETY on EDUCATION" to prescribe a curriculum of study, and to grant Diplomas to Students of Agriculture who shall pass the requisite examination (see p. 65).

4. The advancement of the Veterinary Art, by conferring the Society's Diploma on Students who have passed through a prescribed curriculum, and who are found, by public examination, qualified to practise.

5. The appointment of a Chemist for the purpose of promoting the application of science to Agriculture. Investigations on subjects of importance are conducted in the Laboratory, and published in the Transactions. Members can obtain analyses, reports, and advice, on terms below those charged to others (see p. 67).

6. The establishment of an Agricultural Museum illustrative of the vegetable products of the country.

7. The periodical publication of the Transactions, which comprehend the proceedings in the Laboratory, reports of experiments, and other communications addressed to the Society. The Transactions are published by Messrs BLACKWOOD and SONS, Edinburgh, and may be obtained by Members of the Society, separately, at the reduced price of 4s. annually, or conjoined with Messrs Blackwood's Journal of Agriculture, for 8s.

CONSTITUTION AND MANAGEMENT.

The general business of the HIGHLAND AND AGRICULTURAL SOCIETY is conducted under the sanction and control of a Royal Charter, which authorises the enactment of Bye-Laws. Business connected with Agricultural Education is conducted under the authority of a Supplementary Royal Charter, also authorising the enactment of Bye-Laws.

The Office-Bearers consist of a President, Four Vice-Presidents, Ten Extraordinary, and Thirty Ordinary Directors, a Treasurer, an Honorary and an Acting Secretary, an Auditor and other Officers. The proceedings of the Directors are reported to General Meetings of the Society, held in January, and in June or July. The Council on Education, under the Supplementary Charter, consists of Sixteen Members—Nine nominated by the Charter, and Seven elected by the Society. The Board of Examiners consists of Twelve Members.

New Members are admitted at the General Meetings by Ballot. The ordinary subscription is £1, 3s. 6d. annually, which may be redeemed by one payment, varying, according to the number of previous annual payments, from £12, 12s. to £7, 1s. Tenant-Farmers, Secretaries and Treasurers of local Agricultural Associations, resident Agricultural Factors, and Proprietors farming the whole of their own lands whose valuation does not exceed £500, are admitted on a subscription of 10s. annually, or £5, 5s. for life.

Members of the Society are entitled to apply for District Premiums,—to report Ploughing Matches for the Medal,—to attend Shows and exhibit Stock free of charge,—to consult the Chemist at reduced rates,—and to obtain the Transactions at a modified price.

Orders, payable at the Royal Bank of Scotland, are issued by the Directors, in name of the parties in whose favour Premiums have been awarded.

All communications must be addressed to "JOHN HALL MAXWELL, Esq., C.B., Secretary of the Highland and Agricultural Society of Scotland, No. 6 Albyn Place, Edinburgh."

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Council on Education.

By a Supplementary Charter under the Great Seal, granted in 1856, the Society is empowered to prescribe a Curriculum for Agricultural Education, and to grant Diplomas.

Members of Council named by Charter.

The DUKE OF ARGYLL, *President.* The LORD JUSTICE-GENERAL, *Vice-President.*

The LORD ADVOCATE.
The DEAN of FACULTY.
The PROFESSOR of AGRICULTURE.
The PROFESSOR of ANATOMY.
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The PROFESSOR of NATURAL HISTORY.

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GEORGE HOPE, Fenton Barns.
JOHN MILLER of Leithen.
ROBERT RUSSELL, Pilmuir.
JOHN WILSON, Edington Mains.

Board of Examiners.

Science and Practice of Agriculture—Mechanics, and Architecture of the Farm—Professor JOHN WILSON; GEORGE HOPE, Fenton Barns; ROBERT RUSSELL, Pilmuir; and JOHN WILSON, Edington Mains.

Botany—Professor BALFOUR.

Chemistry—Professor THOMAS ANDERSON.

Natural History—Professor ALLMAN.

Veterinary Surgery—Professor DICK.

Field Engineering and Surveying—JOHN MILLER of Leithen, C.E., and JAMES STIRLING, C.E.

Book-Keeping and Accounts—KENNETH MACKENZIE, Accountant, and PETER M'LAGAN of Pumpherston.

Museum,

GEORGE IV. BRIDGE, OPEN TO THE PUBLIC, FROM 11 TO 4 EVERY DAY, EXCEPT MONDAY.

PREMIUMS.

GENERAL REGULATIONS FOR COMPETITORS.

ALL Reports must be legibly written, and on one side of the paper only; they must specify the number and subject of the Premium for which they are in competition; they must bear a distinguishing motto, and be accompanied by a sealed letter similarly marked, containing the name and address of the Reporter; initials must not be used.

None of the sealed letters, except those belonging to reports found entitled to at least one-half of the Premium offered, will be opened without the Author's consent.

Reports, for which a Premium, or one-half of it, has been awarded, become the property of the Society, and cannot be published, in whole or in part, nor circulated in any manner, without the consent of the Directors. All other papers will be returned to the Author if applied for within twelve months.

When a Report is unsatisfactory, the Society is not bound to award the whole, or any part of a premium.

All Reports must be of a practical character, containing the results of the writer's own observation or experiment, and the special conditions attached to each premium must be strictly fulfilled. General essays, and papers compiled from books, will not be rewarded. Weights and measurements must be indicated by the imperial standards.

The decisions of the Board of Directors are final and conclusive as to all Premiums, whether for Reports, or at general or district Shows, and it shall not be competent to raise any question or appeal touching such decisions before any other tribunal.

Reports on subjects not included in the Premium list will be received, and honorary rewards will be given, when merited.

CLASS I.

REPORTS.

SECTION 1. ON SUBJECTS CONNECTED WITH THE SCIENCE AND PRACTICE OF AGRICULTURE.

1. HIRING MARKETS.

1. For an approved Report on the best designed, the best managed, and the most useful Register for Farm Labourers in operation during the years 1861, 1862, and 1863. The Report shall specify the books used, the rules and regulations in force, the reference made to character, the names of masters and servants entered respectively as desiring servants or situations, and the number of masters and servants supplied during each of the above years, &c.—Twenty-five Sovereigns.

Reports to be lodged by 1st May 1864.

2. For an approved Report on the practical steps most successfully carried into operation for the regulation and improvement of any Hiring-Market held during the years 1861, 1862, and 1863. —taking into account the hours of opening and closing; the hours of arrival and departure of railway trains; the arrangements of the market, including the order, method, and locality of hiring; the nature of the registers in use; the extent to which they are employed; the facilities afforded by them for reference to character; the substitutes for drinking; the providing of temperance refreshments; the getting up and regulation of proper amusements for the people, &c.; the effect of the whole on the sobriety and morality of the people, and on lengthening the duration of service.—Fifty Sovereigns.

Reports to be lodged by 1st May 1864.

2. AGRICULTURE OF ABERDEENSHIRE AND BANFFSHIRE.

For an approved Report on the Agriculture of Aberdeenshire and Banffshire.—Thirty Sovereigns.

The Report should embrace full details of the different systems of farm management observed in the district, and of the progress which Agriculture has made within the last 25 years.

Reports to be lodged by 1st November 1863.

3. AGRICULTURE OF AYRSHIRE AND WIGTOWNSHIRE.

For an approved Report on the Agriculture of Ayrshire and Wigtownshire—Thirty Sovereigns.

The Report should embrace full details of the different systems of farm management observed in the district, and of the progress which Agriculture has made within the last 25 years. Particular reference must be made to the Dairy systems in use, and to the comparative advantages of making cheese on the Cheddar principle.

Reports to be lodged by 1st November 1863.

4. EFFECT OF SPECIAL MANURES OVER A ROTATION.

For an approved Report, to be made after a rotation, on the comparative effects, immediate and continued, of different special Manures—Thirty Sovereigns.

As the object of the premium is to encourage experiments for determining the value of various applications, as regards not only increased quantity and improved quality of crops, but also the permanence of the different substances throughout the rotation, the Report must have reference to points such as specific gravity and quality of turnips—weights of grain, straw, and hay—effects on straw and hay for fodder, and such like. The results obtained from each application to be compared with those of the ordinary manuring of the farm. Each experiment to be conducted on not less than one rood of land, and the whole to be repeated in duplicate, and the exact composition of the special manures used must be given.

Reports to be lodged by 1st November 1863.

5. PHOSPHATIC AND AMMONIACAL MANURES.

For an approved Report on the different effects of Phosphatic manures and Ammoniacal manures, and of a mixture of these substances, when applied to the raising of early and late sown turnips—The Gold Medal, or Ten Sovereigns.

Reports to be lodged by 1st November 1863.

6. SOLUBLE AND INSOLUBLE PHOSPHATES.

For an approved Report on the comparative effects of manures containing insoluble Phosphates, such as bone-ash and coprolites, and the same substances in which the Phosphates have been rendered soluble by acids—The Gold Medal, or Ten Sovereigns.

Reports to be lodged by 1st November 1863.

7. MANURES PRODUCED BY DIFFERENT KINDS OF FEEDING.

For an approved Report of the result of experiments for ascertaining the comparative value of farm-yard manure, obtained from cattle fed upon different varieties of food, by the application of such manures to farm crops—Twenty Sovereigns.

The Report must state the effects produced on two successive crops by the application of manure obtained from cattle fed on different sorts of food, such as turnips and straw alone; and turnips and straw, with an addition of oil-cake, linseed, bean-meal, grain, or other substances. The animals should be as nearly as possible of the same age, weight, condition, and maturity, and each lot should receive daily the same quantity of litter; and, except as to the difference of food, they must be treated alike.

The preparation of the manure, by fermentation or otherwise, should be in every respect the same; and it is desirable that not less than two several experiments be made with each kind, and that the ground to which it is to be applied be as equal as possible in quality and condition.

Reports to be lodged by 1st May in any year.

8. MANURE MADE WITH AND WITHOUT COVER.

For an approved Report on the comparative value of Manure made in the ordinary manner, and of Manure kept under cover till applied to the land—Twenty Sovereigns.

The experiment may be conducted either with manure made in the open strawyard, contrasted with that made in covered hammels or boxes, or with manure made in feeding-houses, part of which shall have been placed under cover, and part removed to the open dung-pit, and kept carefully unmixed with any other manure. Preference will be given to experiments embracing both of these modes. The cattle must be fed and littered alike. There

must be at least an acre of land experimented on with each sort of manure—the different lots must be manured to the same extent, and be equal in soil, and the crops must be accurately weighed and measured on two separate portions of each lot, not less than 20 poles. The result, as given by two successive crops, to be reported.

Reports to be lodged by 1st May in any year.

9. TOP-DRESSING FOR CEREALS.

For an approved Report on the substances which may be most profitably employed in top-dressing Cereal Crops—The Gold Medal, or Ten Sovereigns.

The Report must state the nature of the substances used, the time and cost of the application, and the comparative results, which must be contrasted with those obtained from a portion of the same field to which no top-dressing was applied.

Reports to be lodged by 1st November 1863.

10. AUTUMN MANURING.

For an approved Report on the comparative advantages of applying Manure to the stubble in Autumn, or in the drills in Spring for turnips, potatoes, or beans—Twenty Sovereigns.

The experiment must extend over two years, and comprise a green crop and a grain crop. It must be conducted on not less than four acres—one-half of which shall be dunged in autumn, and the other in spring, with manure made as nearly as possible in the same way, and of equal quantity and quality. The quantities and kinds of special manures applied at any period of the rotation must be the same on each lot, and must be stated. The treatment and condition of the land prior to the experiment must be mentioned.

As the object of this premium is to determine the comparative advantages of autumn manuring, there will be no restriction as to labouring the land, but the Reporter must state how that was done on each lot during the experiment.

Reports to be lodged by 1st May 1864.

11. IMPROVED VARIETIES OF AGRICULTURAL PLANTS.

For an approved Report on the means successfully employed

for obtaining new and superior varieties, or improved sub-varieties of any of the cereal grains, grasses, roots, or other agricultural plants—The Gold Medal, or Ten Sovereigns.

It is necessary that the varieties and sub-varieties reported upon shall have been proved capable of reproduction from seed, and also that the relation they bear to others, or well-known sorts, should be stated. The Reporter is further requested to mention the effects that he may have observed produced by different soils, manures, &c., on the plants forming the subjects of reports, and how far he may have ascertained such effects to be lasting.

Should any improved variety reported upon be the result of direct experiment by cross impregnation, involving expense and long-continued attention, a higher premium will be awarded.

Reports to be lodged by 1st November 1863.

12. DIFFERENT KINDS OF WHEAT.

For an approved Report of experiments conducted for the purpose of determining the relative productiveness in corn and straw of Hunter's, Hopetoun, Fenton, and any other variety of White Wheat—Twenty Sovereigns.

The Experiment must embrace crops 1864 and 1865. Intention to compete must be intimated to the Secretary not later than 1st January 1864. The soil shall be uniform in quality and condition. One acre must be allowed for each kind of wheat, and the lots must be separated by spaces not less than two feet wide. Care must be taken to select true samples of seed for crop 1864, the produce of which shall be used as seed in 1865. Samples of the original seed, and of each year's crop, to be lodged with the Secretary. The wheats to be sown, by drill or broadcast, not later than November, and the crops shall be inspected by a committee in May and July following. The whole produce shall be weighed and measured; and care must be taken thoroughly to clean the threshing-machine before testing each variety. The Report shall further specify the quantity of each variety of seed sown—where it was obtained—the dates of sowing, brairding, earing, ripening—the properties and appearances of the crops when growing—and the produce each year in corn and straw.

Reports to be lodged by 1st November 1865.

13. DIFFERENT KINDS OF OATS.

For an approved Report of experiments conducted for the purpose of determining the relative productiveness in corn and straw of the following varieties of Oats:—Potato, Hopetoun, Sandy, late Angus, and Black Tartar—Fifteen Sovereigns.

The Experiment must embrace crops 1863 and 1864. Intention to compete must be intimated to the Secretary not later than 1st May 1863. The soil shall be uniform in quality and condition. One acre must be allowed for each variety, and the lots must be separated by spaces not less than two feet wide. Care must be taken to select true samples of seed for crop 1863, the produce of which shall be used as seed in 1864. Samples of the original seed, and of each year's crop, to be lodged with the Secretary. The oats may be sown, by drill or broadcast, and the crops shall be inspected by a committee in June and July following. The whole produce shall be weighed and measured; and care must be taken thoroughly to clean the threshing-machine before testing each variety. The Report shall further specify the quantity of each variety of seed sown—where it was obtained—the dates of sowing, brairding, earing, ripening—the properties and appearances of the crops when growing—and the produce each year in corn and straw.

Reports to be lodged by 1st November 1864.

14. COMPARATIVE PRODUCTIVENESS, &c., OF POTATOES.

For an approved Report on the comparative productiveness, and general qualities for use and keeping, of the different kinds of Potatoes used in field culture, and the results observable on the white crops following different varieties of Potatoes—The Gold Medal, or Ten Sovereigns.

Reports to be lodged by 1st May 1864.

15. COMPARATIVE PRODUCTIVENESS, &c., OF TURNIPS.

For an approved Report of the comparative productiveness, and general qualities for use and keeping, of the different kinds of Swedish, Yellow, and White Turnips, generally used in field culture, and the results observable on the white crops following different varieties—The Medium Gold Medal, or Five Sovereigns.

Reports to be lodged by 1st May 1864.

16. CABBAGE.

For an approved Report on the cultivation of the Cabbage as a field crop—The Medium Gold Medal, or Five Sovereigns.

The experiment must be conducted on not less than one acre, and contrasted with a like extent under turnips in the same field. Both lots must have been under one rotation, and must be prepared and manured in the same manner.

Reports to be lodged by 1st May 1864.

17. VEGETABLE PRODUCTIONS OF INDIA, CHINA, AMERICA, &c.

For an approved Report on the hardy and useful Herbaceous Plants, including Grains and Grasses of China, Japan, the Islands of the Eastern Archipelago, the Himalaya Country, the Falkland and South Sea Islands, California, the high north-western districts of America, or any other country where such climate exists as to induce the belief that the plants may be beneficially introduced into the cultivation of Scotland—The Gold Medal, or Ten Sovereigns.

Reporters are required to give the generic and specific names of the plants treated of, with the authority for the same—together with the native names, in so far as known; and to state the elevation of the locality and nature of the soil in which they are cultivated, or which they naturally inhabit, with their qualities or uses; and it is further requested that the descriptions be accompanied, in so far as possible, with specimens of the plants, and their fruit, seed, or other products.

Reports to be lodged by 1st November in any year.

FEEDING STOCK.

The experiments specified in Nos. 18, 19, 20, and 21, must be conducted over a period of not less than three months. No lot shall consist of fewer than four Cattle or ten Sheep. The animals selected should be of the same age, sex, and breed, and, as nearly as possible, of the same weight, condition, and maturity. Their live weight before and after the experiment must be stated, and, if killed, their dead weight and quantity of tallow.

18. BEST MODES OF HOUSING FATTENING CATTLE.

For an approved Report on the comparative advantages of fat-

tening Cattle in stalls, in loose houses or boxes, and in sheds or hammels—Twenty Sovereigns.

The Report must detail the comparative result of actual experiments. The same quantities and kinds of food shall be used. Information is required as to the comparative expense of attendance, the cost of erecting the buildings, and any other circumstances deserving of attention. The state of the weather during the experiment in point of temperature and wetness must be particularly noted and reported.

Reports to be lodged by 1st May in any year.

19. DIFFERENT DESCRIPTIONS OF FOOD.

For an approved Report of experiments for ascertaining the actual addition of weight to growing or fattening stock, by the use of different kinds of food—Twenty Sovereigns.

The attention of the experimenter is directed to turnips, carrots, beet, mangold-wurzel, potatoes, cabbage, as well as to beans, oats, barley, Indian corn, linseed, oil-cake, or rape-cake, and to the effect of warmth and proper ventilation, and the difference between food cooked and raw. The above roots and other kinds of food are merely suggested; Competitors are neither restricted to them, nor obliged to experiment on all of them.

When experiments are made with linseed and cake, attention should be paid to the comparative advantages, economically and otherwise, of the substances in these two states.

Before commencing the comparative experiments, the animals must be fed alike for some time previously.

The progress of different breeds may be compared; this will form an interesting experiment of itself, for Reports of which encouragement will be given.

Reports to be lodged by 1st May in any year.

20. COMPARATIVE FEEDING QUALITIES OF LINSEED-CAKE AND RAPE-CAKE.

For an approved Report on the comparative feeding qualities of Linseed-Cake and of Rape-Cake, to be ascertained by feeding two lots of Cattle on each of these substances, with or without Turnips, or other ordinary food, equal quantities of the two cakes being given—The Gold Medal, or Ten Sovereigns.

Reports to be lodged by 1st May 1864.

21. COMPARATIVE FATTENING QUALITIES OF PURE AND CROSS-BRED SHEEP.

For an approved Report of experiments for determining the comparative fattening qualities of pure and cross-bred Sheep—The Gold Medal, or Ten Sovereigns.

One lot must consist of any pure breed, the other of any cross between that and another breed. The same descriptions of food must be given; the quantities consumed, and the increase in the weight and value of each lot, must be carefully noted.

Reports to be lodged by 1st May 1864.

22. INTERNAL PARASITES.

For an approved Report on the natural history, symptoms, causes, preventive and remedial treatment of the internal Parasites by which domestic animals are affected—The Gold Medal, or Ten Sovereigns.

Reports to be lodged by 1st November 1863.

23. MURRAIN.

For an approved Report on the nature, symptoms, causes, preventive and remedial treatment of Murrain in domestic animals—The Gold Medal or Ten Sovereigns.

Reports to be lodged by 1st November 1863.

24. SCAB IN SHEEP.

For an approved Report on the nature, symptoms, causes, preventive and remedial treatment, of Scab in Sheep—The Gold Medal, or Ten Sovereigns.

Reports to be lodged by 1st November 1863.

25. FOOT ROT.

For an approved Report on the nature, symptoms, causes, preventive and remedial treatment of Foot Rot in Sheep—The Gold Medal or Ten Sovereigns.

Reports to be lodged by 1st November 1863.

26. RURAL ECONOMY ABROAD.

For an approved Report, founded on personal observation, of any useful practice, in rural economy, adopted in other countries,

and susceptible of being introduced with advantage into Scotland —The Gold Medal.

The purpose chiefly contemplated by the offer of this premium, is to induce gentlemen who may visit other countries to notice and record such particular practices as may seem calculated to benefit their own country.

Reports to be lodged by 1st November in any year.

SECTION 2. WOODS AND PLANTATIONS.

1. EXTENSIVE PLANTING.

For an approved Report by a Proprietor who shall, within the five preceding years, have planted not less than 150 acres. The whole planting operations that may have been conducted by the Reporter within the five years, whether completed or not, must be embraced, and he must state the expense—description of soil—age, kind, and number of trees planted per acre—mode of planting, draining, and fencing—general state of the plantation—and any other observations of interest—The Gold Medal.

Reports to be lodged by 1st November in any year.

2. FORMATION AND MANAGEMENT OF YOUNG PLANTATIONS.

For an approved Report of Plantations formed within a period of not more than ten, nor less than five years preceding the date of the Report—The Gold Medal, or Ten Sovereigns.

The Report should comprehend every interesting particular; among others, the exposure, altitude, and general climate of the locality—the character and condition of the soil and subsoil—a detailed statement of the expense, including that of enclosing, draining, and fencing, and a specification of the manner in which these operations were performed—the mode of planting adopted—the prevailing weather while planting, and for a month after the operation—the kind of trees planted, and the number of each kind per acre—their relative progress—the proportion of blanks and deaths at the end of three years—the system of management—the state of the plantations at the date of making the Report—and any other observation of interest.

Reports to be lodged by 1st November in any year.

3. GENERAL MANAGEMENT OF PLANTATIONS.

For an approved Report of the management of Plantations, from the commencement of the first thinning till the period of yielding full-grown timber—The Gold Medal, or Ten Sovereigns.

The Report should embrace the following points:—the progress of the different sorts of trees—the effects of altitude and exposure—the general advantages of shelter—the mode of thinning and pruning adopted—the uses and value of the thinnings—the plan of registry and of valuing, or a specimen of the method in which the forester's book is kept—the valuation at the time of the Report—together with such general remarks as may be thought useful.

The Report is not expected to embrace the formation and early management, farther than the description of soil, kinds of plants, whether mixed or in masses, together with a note of the expense from the time of planting to the commencement of the first thinning, in so far as such information is in the possession of the Reporter.

Reports to be lodged by 1st November in any year.

4. USES AND VALUE OF TIMBER.

For an approved Report on the economic uses and comparative value of different descriptions of Timber grown in Scotland—The Gold Medal, or Ten Sovereigns.

This premium may be regarded as a sequence to Nos. 2 and 3; the object being to obtain the practical and economic results of planting, by ascertaining the purposes to which it has been applied, and the pecuniary returns it has yielded.

The Reporter, besides stating the actual results of his own observation and experience, should indicate the objects which planters ought to have in view with reference to profitable return, by stating the kinds of trees that should be planted—the periods at which they should be cut—the purposes to which they should be applied—and the returns that may be looked for, in different localities, and under different circumstances.

There must be a general description of the management, soil, altitude, exposure, &c., of the particular woods reported on,

and attention is directed to the difference supposed to exist in the quality of natural and planted timber.

Reports to be lodged by 1st November in any year.

5. PLANTING ON EXPOSED OR ON BARREN TRACTS.

For an approved Report on successful planting within the influence of the sea, or on exposed sterile tracts, founded on observation of the habits and appearance of the different sorts of trees considered best suited for such situations—The Gold Medal, or Ten Sovereigns.

The plantations reported on must not be less than ten years old.

Information is particularly desired regarding the species and varieties of trees calculated for growing in situations unfavourable to most of those generally cultivated, as bleak heaths, sandy links, unsheltered maritime situations, and high northern exposures.

The Reporter must specify the extent of planting and mode of drainage and fencing—the nature of the soil and subsoil—the elevation and exposure of the locality—its distance from the sea; and, if in his power, he should notice the geological features of the district.

Reports to be lodged by 1st November in any year.

6. MIXED PLANTATIONS.

For an approved Report on the trees best adapted for giving a pleasing effect to the landscape during different seasons—The Medium Gold Medal, or Five Sovereigns.

Much is still to be done in judiciously grouping and arranging trees in large policies, particularly as regards the autumnal effect; attention is therefore particularly directed to contrasts of colour, and a list of varieties must be given.

Reports to be lodged by 1st November 1863.

7. CORSICAN FIR.

For an approved Report on the value, for economical purposes, of the Corsican Fir, and on its adaptation to different soils and situations—The Medium Gold Medal, or Five Sovereigns.

Reports to be lodged by 1st November in any year.

8. AMERICAN AND CANADIAN TREES.

For an approved Report on the American and Canadian forest trees adapted for cultivation in Great Britain—The Medium Gold Medal, or Five Sovereigns.

The Reporter will enumerate and describe the varieties which have been, or which may be, usefully introduced from North America; the soils, situations, and conditions most suitable for them, their economic uses and qualities, and the success which may have attended the cultivation of any of them in Great Britain.

Reports to be lodged by 1st November 1863.

9. FOREST TREES OF RECENT INTRODUCTION.

For an approved Report on the more extended introduction of hardy, useful, or ornamental trees, which have not hitherto been generally cultivated in Scotland—The Medium Gold Medal, or Five Sovereigns.

The Report should specify, as distinctly as possible, the kind of trees introduced. The nature of the plantation should likewise be described as to soil, exposure, shelter, and elevation above the level of the sea. The adaptation of the trees for use or ornament, and their comparative progress, should be mentioned. Attention is directed to the introduction into use of any tree as a nurse in young plantations, which, by growing rapidly for several years, and attaining maturity when at the height of 20 or 25 feet, might realize the advantages and avoid the evils of thick planting.

Reports to be lodged by 1st November in any year.

10. ROOTS OF CONIFERÆ.

For an approved Report of experiments on the uses to which the fibrous parts of the roots of Coniferous trees may be applied—The Medium Gold Medal, or Five Sovereigns.

In North-West America, the fibrous parts of the roots of some of the Coniferous trees are extensively employed for purposes similar to those to which willows are applied in this country, more particularly when the wood has been grown on soft peaty soils. The object of the premium is to elicit information regarding the possibility of profitably extracting, and economically applying the vast quantities of roots left in the ground.

Reports to be lodged by 1st November in any year.

SECTION 3. LAND IMPROVEMENTS.

1. GENERAL IMPROVEMENT OF ESTATES.

To the Proprietor who shall report the most judicious, successful, and extensive improvement—The Gold Medal, or Ten Sovereigns.

The merits of the Report will not be determined so much by the mere extent of the improvements, as by their character and relation to the size of the property. The improvements may comprise reclaiming, draining, enclosing, planting, road-making, building, and all other operations proper to landed estates. The period within which the operations may have been conducted is not limited, except that it must not exceed the term of the Reporter's proprietorship.

Reports to be lodged by 1st May in any year.

2. RECLAMATION OF WASTE LAND BY TILLAGE.

1. For an approved Report by a Proprietor or Tenant of having reclaimed, within the six preceding years, not less than fifty acres of Waste Land—The Gold Medal, or Ten Sovereigns.

2. For an approved Report by a Tenant of having reclaimed within the four preceding years, not less than twenty acres of Waste Land—The Medium Gold Medal, or Five Sovereigns.

3. For a similar Report by a Tenant of having reclaimed not less than ten acres—The Silver Medal.

The Reports may comprehend such general observations on the improvement of waste lands as the writer's experience may lead him to make, but must refer especially to the lands reclaimed—to the nature of the soil—the previous state and probable value of the subject—the obstacles opposed to its improvement—the details of the various operations—the mode of cultivation adopted—and the produce and value of the crops produced. As the required extent cannot consist of different patches of land, the improve-

ment must have relation to one subject, it must be of a profitable character, and a rotation of crops must have been concluded before the date of the Report. *A detailed statement of the expenditure and return*, and a certified measurement of the ground, are requisite.

Reports to be lodged by 1st May in any year.

3. IMPROVEMENT OF NATURAL PASTURE WITHOUT TILLAGE.

1. For an approved Report of the improvement of the pasturage of not less than thirty acres, by means of top-dressing, draining, or otherwise without tillage, in situations where tillage may be inexpedient—The Gold Medal or Ten Sovereigns.

2. For an approved Report of a similar improvement of not less than ten acres—The Silver Medal.

Reports must state the particular mode of management adopted, the substances applied, the elevation and nature of the soil, its previous natural products, and the changes produced.

Reports to be lodged by 1st May in any year.

SECTION 4. AGRICULTURAL MACHINERY.

INVENTION OR IMPROVEMENT OF IMPLEMENTS OF HUSBANDRY.

For approved Reports of such inventions or improvements, by the Reporters, of any Agricultural Implement or Machine as shall be deemed by the Society of public utility—Medals, or sums of money not exceeding Fifty Sovereigns.

Reports may be lodged with the Secretary at any time, and should be accompanied by drawings and descriptions of the implement or machine, and, if necessary, by a model.

CLASS II.

DISTRICT COMPETITIONS.

(*Grants in aid of* DISTRICT COMPETITIONS *for* 1864 *must be applied for before* 1*st* NOVEMBER *next.*)

SECTION I. CATTLE.

1. *The District of Lorn.*
2. *The District of Mar.*
3. *The County of Ayr.*
4. *The County of Renfrew.*
5. *The County of Stirling.*
6. *The County of Inverness.*
7. *The District of Strathbogie.*
8. *The District of Strontian.*
9. *The Island of Skye.*
10. *The County of Banff and District of Turriff.*
11. *The District of Cowal.*
12. *The District of the Royal Northern Society.*
13. *The District of Deeside.*

Conveners of Committees.

FIRST DISTRICT—Dugald Macdougall of Gallanach.
SECOND DISTRICT—Archibald Grant of Tillyfour.
THIRD DISTRICT—Sir James Fergusson, Bart., M.P.
FOURTH DISTRICT—Lieut.-Col. Mure of Caldwell.
FIFTH DISTRICT—John Stirling of Kippendavie.
SIXTH DISTRICT—Æneas W. Mackintosh of Raigmore.
SEVENTH DISTRICT—Robert Simpson of Cobairdy.
EIGHTH DISTRICT—Sir Thomas Miles Riddell, Bart.
NINTH DISTRICT—Alex. K. Mackinnon of Corry.
TENTH DISTRICT—Alexander Morison of Bognie.
ELEVENTH DISTRICT—Alexander S. Finlay of Castle Toward, M.P.
TWELFTH DISTRICT—Alexander Thomson of Banchory.
THIRTEENTH DISTRICT—Sir James H. Burnett, Bart.

PREMIUMS.

1. For the best Bull, of any pure breed, not exceeding eight years old, belonging to a Proprietor or Factor—The Silver Medal.

2. For the best Bull, of any pure breed, calved before 1st January 1861, and not exceeding eight years old, . £8

3. For the second best, ... £4

4. For the best Bull, of any pure breed, calved after 1st January 1861, ... £5

5. For the best pair of Heifers, of any pure breed, of two years old (if Highland breed, three years), . . £5

6. For the second best, ... £3

The Money Premiums are restricted to Tenants, and Proprietors farming the whole of their own lands.

Note.—The Society's Premiums are granted to each district for three alternate years, on condition that the district shall, in the two intermediate years, continue the Competitions by offering for the same description of stock a sum not less than one-half of that given by the Society.

At the intermediate Competitions, a Silver Medal will be placed at the disposal of the Committee to be awarded to the best lot exhibited.

In 1863

Nos. 1 and 2 are in competition for the last year.
Nos., 3, 4, 5, 6, and 7, for the second year.
Nos. 8, 9, and 10, for the first year.

Nos. 11, 12, and 13, compete for local Premiums.

RULES OF COMPETITION.

1. The Members of the Society connected with the respective Districts are appointed Committees for regulating the Competitions; five members to be a quorum.

2. The Convener of each district shall summon a Meeting of Committee for

he purpose of determining the time and place of Competition, the nomination of Judges, and other preliminary arrangements. The time and place (which must be within the bounds of the district) shall be publicly intimated by Conveners, in such a manner as may appear to them most effectual.

3. The Competitions must take place between the 1st of April and the 1st of November. The animals exhibited must belong to one of the following pure breeds:—Shorthorn—Ayrshire—Polled (Galloway, Angus, or Aberdeen)—Highland. The Bulls may be of one breed, and the Heifers of another. The Committee shall select the breed, and specify it in the returns.

4. Stock of an inferior description, or which does not fall within the prescribed regulations, shall not be placed for competition. The Premiums shall not be divided. *No money Premium shall be adjudged unless there are three lots exhibited, and not more than one-half, unless there are six.* A Competitor may exhibit two lots in each class. For the Medal, two lots authorise an award.

5. An animal which has gained the Society's first Premium at a previous District or General Show is inadmissible in the same class, except for the Medal; and one which has gained a second money Premium can only thereafter compete in that class for the first.

6. A Tenant may compete with Proprietors and Factors for the Medal with a Bull which has gained the first money Premium at a previous Show. When there is any doubt as to whether a Competitor should be ranked as a Proprietor or a Tenant, the point is left to the decision of the Local Committee. Factors can only compete for the Medal.

7. A Bull, the property of two or more Tenants, may compete, although the Exhibitors may not be joint tenants. Bulls not belonging to the District may compete, provided they are left within it for service.

8. Stock must be the property of the Exhibitor at the date of entry, *and no entry shall be received later than one week previous to the Show.* Entry money shall not exceed 2½ per cent. on the amount of premium to be competed for.

9. Bulls for which the money Premiums are awarded may be required to serve in the District at least one season; the rate of service to be fixed by the Committee.

10. Should it be proved to the satisfaction of the Committee that an animal has been entered under a false name, pedigree, or description, for the purpose of misleading the Committee or Judges as to its qualifications or properties, the case shall be reported to the Directors, and submitted by them to the first General Meeting, in order that the Exhibitor shall be disqualified from again competing at the Society's Shows, and his name, if he be a member, struck from the roll.

11. When an animal has previously been disqualified by the decision of any Agricultural Association in Great Britain or Ireland, such disqualification shall attach, if the Exhibitor, being aware of the disqualification, fail to state it, and the grounds thereof, in his entry, to enable the Committee to judge of its validity.

12. Blank Reports will be furnished to the Conveners of the different Districts. These must, in all details, be completed and lodged with the Secretary on or before the 1st of November next.

13. A Report of the Competition and Premiums awarded at the *intermediate*

Local Shows, in the several Districts, signed by a Member of the Society, must be transmitted to the Secretary on or before the 1st of November in each year, otherwise the Society's grant shall terminate.

14. It is to be distinctly understood, that in no instance does any claim lie against the Society for expenses attending a Show of Stock, beyond the amount of the Premiums offered.

Section 2. DRAUGHT HORSES.

1. *The County of Lanark.*
2. *The County of Linlithgow.*
3. *The County of Edinburgh.*

Conveners of Committees.

First District—J. G. C. Hamilton of Dalzell.
Second District—R. H. Johnston Stewart of Straiton.
Third District—Sir James Gardiner Baird, Bart.

PREMIUMS.

1. For the best Stallion, for agricultural purposes, not under three years and nine months, and not above twelve years old, £25
2. For the best Brood Mare, for agricultural purposes, . £10
3. For the best Filly, foaled after 1st January 1861, . £5

These premiums are granted for two years, £30 being contributed by the Society, and £10 by the District.

In 1863

Nos. 1, 2, and 3 are in competition for the first year.

RULES OF COMPETITION.

1. The Members of the Society in the District are appointed a Committee of Superintendence. They shall be convened in the manner and for the purposes prescribed by Nos. 1 and 2 of the Regulations for Cattle Competitions.

2. The Competition for Stallions, and that for Mares and Fillies may be held at different periods, but both must take place within the districts named.

3. If fewer than three animals be exhibited in any class, half the Premium only can be awarded. The Regulations for Cattle Shows, regarding intima-

tion—entry of stock—its exclusion, if of inferior character—false entries—extra expenses—and the manner in which the Reports are to be certified and transmitted to the Society—are severally applicable to the Premiums for Horses. Evidence must be produced that the Prize Stallions have had produce. Mares must have foals at their feet, or be entered as being in foal; in the latter case payment of the Premium will be deferred till certificate of birth.

ENTIRE COLTS.

1. *The County of Caithness.*
2. *The County of Kincardine.*
3. *The District of the Perth, Fife, Kinross, and Clackmannan Association.*
4. *The Stewartry of Kircudbright.*
5. *The District of Machars in Wigtownshire.*

Conveners of Committees.

First District—Alexander Henderson of Stemster.
Second District—Sir Thomas Gladstone, Bart.
Third District—Lord Kinnaird, K.T.
Fourth District—James Mackie of Bargaly, M.P.
Fifth District—R. Vans Agnew of Barnbarroch.

PREMIUMS.

1. For the best Entire Colt, for agricultural purposes, foaled after 1st January 1861, ... £6
2. For the best Entire Colt, for agricultural purposes, foaled after 1st January 1862, ... £4

Four lots in each Class will warrant the award of full, and two lots of half, premiums. The other regulations for Horses are generally applicable. These premiums are granted for two years.

In 1863

Nos. 1 and 2 are in competition for the last year.
Nos. 3, 4, and 5, for the first year.

Section 3. SHEEP.

The Premiums for Sheep are granted for three alternate years, under the same conditions as those for Cattle. See Note p. 28.

A Silver Medal, as in the case of Cattle, is allowed for the intermediate years.

1. LEICESTER BREED.

1. *The County of Haddington.*

Convener of Committee.

James W. Hunter of Thurston.

1. For the best Tup, belonging to a Proprietor or Factor—The Silver Medal.
2. For the best Tup of any age, ... £5
3. For the best two Shearling Tups, . . . £5
4. For the best Pen of five Ewes, not less than two Shear, £5
5. For the best Pen of five Gimmers or Shearling Ewes, £4

The Money Premiums are restricted to Tenants and Proprietors farming the whole of their own lands.

In 1863

No. 1. Competes for local Premiums.

2. CHEVIOT BREED.

1. *The Districts of Mull and Morven.*
2. *The Districts of Gairloch and Lochbroom.*
3. *The District of Nithsdale.*
4. *The District of Annandale.*
5. *The Districts of Eskdale and Liddesdale.*
6. *The Islands of Islay, Jura, and Colonsay.*
7. *The District of West Teviotdale.*
8. *The County of Peebles.*

Conveners of Committees.

First District—Farquhar Campbell of Aros.
Second District—Sir Kenneth S. Mackenzie of Gairloch, Bart.
Third District—Wm. Maxwell of Carruchan.

FOURTH DISTRICT—John J. Hope Johnstone of Annandale, M.P.
FIFTH DISTRICT—James Connell of Conheath.
SIXTH DISTRICT—Richard D. Campbell of Jura.
SEVENTH DISTRICT—Allan Eliott Lockhart of Borthwickbrae.
EIGHTH DISTRICT—Sir Graham G. Montgomery, Bart.

1. For the best Tup, belonging to a Proprietor or Factor—The Silver Medal.
2. For the best Tup of any age, ... £5
3. For the best two Shearling Tups, . . . £5
4. For the best Pen of five Ewes, not less than two Shear, £5
5. For the best Pen of five Gimmers or Shearling Ewes, . £4

The Money Premiums are restricted to Tenants and Proprietors farming the whole of their own lands.

In 1863

Nos. 1, 2, 3, 4, and 5 are in competition for the last year.

Nos. 6, 7, and 8 compete for local Premiums.

3. BLACK-FACED BREED.

DISTRICTS.

1. *The Island of Arran.*
2. *The Upper Ward of Lanarkshire.*
3. *The District of Argyll.*
4. *The District of Lochaber.*
5. *The Districts of Badenoch and Rothiemurchus.*

Conveners of Committees.

FIRST DISTRICT—James Paterson, Whitehouse.
SECOND DISTRICT—John Ord Mackenzie of Dolphinton.
THIRD DISTRICT—William Campbell of Ormsary.
FOURTH DISTRICT—Donald Cameron of Lochiel.
FIFTH DISTRICT—Cluny Macpherson.

1. For the best Tup, belonging to a Proprietor or Factor—The Silver Medal.
2. For the best Tup of any age, ... £5
3. For the best two Shearling Tups, . . . £5
4. For the best Pen of five Ewes, not less than two Shear, £5

5. For the best Pen of five Gimmers or Shearling Ewes, £4

The Money Premiums are restricted to Tenants and Proprietors farming the whole of their own lands.

In 1863

No. 1 is in competition for the last year.
Nos. 2 and 3 for the second year.
No. 4 for the first year.

No. 5 competes for local Premiums

RULES OF COMPETITION.

1. The Members of this Society in the several Districts are appointed Committees as under Nos. 1 and 2 of the Regulations for Cattle Competitions, and they shall be convened by their respective Conveners in the manner and for the purposes specified in these regulations.

2. The Competition shall take place between the 1st of April and the 1st of November, and the time and place must be publicly intimated by each Convener within his District.

3. Tups shall have served the usual number of Ewes for at least three weeks during the previous season. All prize Tups must serve within the District. The Competitions are open to Tups not belonging to the District, provided they are left for service. Ewes must have reared Lambs during the season. Ewes and Gimmers must be taken from regular breeding hirsels.

4. The Premiums shall not be divided. *No money premiums shall be adjudged unless there are three lots exhibited, and only one-half if there are not six lots.* Each Competitor may show two lots. For the Medal two lots authorise an award. The other Regulations for Cattle Competitions,—in regard to the date of Entry—the amount of Entry-Money—the placing of Stock—the exclusion of Animals which have gained premiums at previous Shows—the right of a Tenant, under certain circumstances, to compete for the Medal—reporting false entries—the Regulation as to expenses—and the manner in which the Reports must be certified and transmitted,—are applicable to the Premiums for Sheep.

5. Blank reports will be furnished to the Conveners of Districts. These must be accurately filled up in all details, signed by the Convener, and transmitted to the Secretary by the 1st of November.

4. SHEARING SHEEP.

The Silver Medal will be given to the best Sheep-shearer in each of the Districts in which the Premiums for Sheep are in operation.

CONDITIONS.

1. Money Premiums must be awarded by the District at each Competition to the amount of not less than £2.

2. The District Convener will fix the time and place of Competition, and make all necessary arrangements.

3. The Medal shall not be awarded unless there are three competitors, and it shall always accompany the highest Money Premium. If two or more lots appear to be equally well executed, preference should be given to that executed within the shortest time.

4. The Conveners shall report the particulars of the Competition and the award of the Judges to the Society, along with the Report of the Sheep Premiums in the District.

SECTION 4. SWINE.

DISTRICTS.

1. *The District of Moffat.*
2. *The District of Alford.*

Conveners of Committees.

FIRST DISTRICT—J. J. Hope Johnstone, of Annandale, M.P.
SECOND DISTRICT—R. Farquharson of Haughton.

1. For the best Boar belonging to a Proprietor or Factor—The Silver Medal.
2. For the best Boar, ... £4
3. For the second best, ... £2
4. For the best Breeding Sow, ... £3
5. For the second best, ... £1

The Money Premiums are restricted to Tenants and Proprietors farming the whole of their own lands.

The above Premiums are given to each District for three consecutive years.

In 1863

No. 1 is in competition for the third year.
No. 2 for the first year.

The Regulations for Cattle Competitions are generally to be held as applicable to the Premiums for Swine; and the Convener and Committee of the Society's Members in the District are accordingly referred to them.

Four lots in each Class will warrant the award of full, and two lots of half Premiums. There must be at least two Competitors for the Medal.

Blank Reports will be furnished to the Conveners of Districts. These must be accurately filled up in all details, signed by the Convener, and transmitted to the Secretary by the 1st of November 1863.

CLASS III.

DAIRY PRODUCE.

DISTRICTS.

1. *The County of Wigtown.*
2. *The County of Ayr.*
3. *The District of Nithsdale.*
4. *The County of Lanark.*

Conveners of Committees.

First District—David Guthrie, Stranraer.
Second District—Sir James Fergusson, Bart., M.P.
Third District—William Maxwell of Carruchan.
Fourth District—John P. Alston of Muirburn.

1. BUTTER.

1. For the best sample of Cured Butter (not less than 14 lbs.) belonging to a Proprietor or Factor—The Silver Medal.
2. For the best sample of Cured Butter (not less than 14 lbs.) . . . £3
3. For the second best, ... £2

2. CHEESE.

4. For the best couple of Sweet-Milk Cheeses belonging to a Proprietor or Factor—The Silver Medal.
5. For the best couple of Sweet-Milk Cheeses, . . £3
6. For the second best, ... £2

The Money Premiums are restricted to Tenants and Proprietors farming the whole of their own lands.

The above Premiums are given to each District for three consecutive years.

In 1863

Nos. 1, 2, and 3, are in competition for the last year.
No. 4 for the first year.

CONDITIONS.

1. The Members of the Society, resident within the Districts, are appointed Committees of Superintendence, for the purposes expressed in the Regulations for Cattle Competitions. Each Committee shall fix such general regulations as they may consider proper—and, in particular, the time and place of competition.

2. Eight lots in any one Class will warrant an award of full, and four lots of half Premiums. There must be at least two Competitors for the Medal.

3. Competitors must certify that the Butter and Cheese exhibited by them are average specimens of the produce of their Dairies in 1863; and that the quantity produced during the season has not been less than 1 cwt. of Butter, or 2 cwt. of Cheese.

4. In the event of two or more competing lots being deemed equal in quality, the Premium shall be awarded to the Competitor who has made the larger quantity.

5. The successful Competitors, before receiving the Premiums, are required to transmit to the Secretary a detailed Report of the whole process followed by them in the manufacture of their Butter or Cheese.

6. Reports of the award of the Premiums to be lodged with the Secretary on or before the 1st November 1863.

CLASS IV.

CROPS AND CULTURE.

I.—SEEDS.

The Society, with a view of aiding local Associations, gives the Silver Medal to the grower of the best Seeds for which Premiums in money shall have been awarded in the following districts:—

1. County of FIFE: Convener, Alex. Bethune of Blebo.

   1. Any variety of Wheat.
   2. Any variety of Barley.
   3. Any variety of Oats.
   4. Perennial Rye Grass.

2. County of WIGTOWN: Convener, Viscount Dalrymple.

   1. Any variety of Wheat.
   2. Any variety of Barley.
   3. Any variety of Oats.
   4. Perennial Rye Grass.

3. County of AYR: Convener, Sir James Fergusson, Bart., M.P.

   1. Any variety of Wheat.
   2. Any variety of Barley.
   3. Any variety of Oats.
   4. Perennial Rye Grass.

4. County of FORFAR: Convener, Sir John Ogilvy, Bart., M.P.

   1. Any variety of Wheat.
   2. Any variety of Barley.
   3. Any variety of Oats.
   4. Perennial Rye Grass.

5. County of STIRLING: Convener, John Stirling of Kippendavie.

1. Any variety of Wheat.
2. Any variety of Barley.
3. Any variety of Oats.
4. Any variety of Beans.
5. Tares.

6. District of WESTER ROSS: Convener, Keith W. Stewart Mackenzie of Seaforth.

1. Any variety of Wheat.
2. Any variety of Barley.
3. Any variety of Oats.
4. Perennial Rye Grass.

7. District of The BLACK ISLE: Convener, Sir J. J. R. Mackenzie, Bart.

1. Any variety of Barley.
2. Any variety of Oats.

CONDITIONS.

1. In each District the Convener shall fix the time and place of Competition, appoint the Judges, and make all other necessary arrangements, in concurrence with the other Members of the Society, and the local Association of the District. Conveners will be furnished with blank Schedules for reporting the awards.

2. The quantity shown in Competition by each Grower must not be less than three quarters of each variety of Grain, or two quarters of Beans or Grass Seeds. To authorise the award of the Medal, there must at least be two Competitors. The first Premium awarded by the District shall not be less than £1 for each kind of grain for which a Medal is claimed.

3. The Judges shall be guided in their awards—1*st*, By the purity of the Seed; 2*d*, By its freeness from extraneous seeds; and, 3*d*, Where there is an equality in these respects, by the weight.

4. Successful Competitors must immediately transmit, free of expense, two quarts of each kind of seed, addressed to the Secretary at the Society's Museum, George IV. Bridge, Edinburgh.

5. The Returns must show, as accurately as possible, the produce per imperial acre, also the altitude, exposure, and nature of the soil on which the crops were raised, together with the dates of sowing and reaping, and the weight per bushel. The varieties for which Premiums have been given must be named. Reports of the several Competitions must be lodged by the 1st of November.

6. The medals will be continued in each District for five consecutive years. Applications from other Districts must be lodged with the Secretary of the Society by 1st November next.

2. PLOUGHING COMPETITIONS.

The Silver Medal will be given to the winner of the first Premium at Ploughing Competitions, where there are fifteen Ploughs, and Premiums to the amount of Three Sovereigns, provided a Report in the following terms is made to the Secretary, within one month of the Competition, by a Member of the Society, and the undernoted conditions have been observed :—

FORM OF REPORT.

I of Member of the Highland and Agricultural Society, hereby certify, that I attended the Ploughing Match of the Association at in the County of on the when ploughs competed; of land was assigned to each, and hours were allowed for the execution of the work. The sum of £ was awarded in the following proportions, viz :—

[Here enumerate the names and designations of successful Competitors.]

CONDITIONS.

1. All Matches must be at the instance of a local Society or Ploughing Association, and no Match at the instance of an individual, or confined to the tenants of one estate, will be recognised.

2. The title of such Society or Association, together with the name and address of its Secretary, must be registered with the Secretary of the Highland and Agricultural Society, No. 6 Albyn Place, Edinburgh.

3. Not more than one Match, in the same season, can take place, within the bounds of the same Society or Association.

4. All Reports must be lodged within one month of the date of the Match, and certified by a Member of the Society who was present at it.

5. A Member can only report one Match, and a Ploughman can only carry one Medal, in the same season.

6. To warrant the Medal, there must have been fifteen Ploughs in Competition, and Three Pounds awarded in Premiums.

7. Ploughmen shall not be allowed any assistance, and their work must not be set up nor touched by others; on land of average tenacity the ploughing should be at the rate of an imperial acre in ten hours, and attention should be given to the sufficiency of the work below, as well as to its neatness above the surface.

3. REAPING MACHINES.

The Silver Medal will be given to the Servant found most expert at a trial of Reaping Machines, when not fewer than four were in operation, and Premiums to the amount of Two Sovereigns were awarded. Reports must be lodged with the Secretary by a Member who has inspected the work, not later than the 1st of November.

4. MEDALS IN AID OF PREMIUMS GIVEN BY LOCAL SOCIETIES.

The Society being anxious to co-operate with local Associations, will give a limited number of Silver Medals annually, in addition to the Money Premiums awarded in the district:—

1. STOCK.—To Local Societies not on the list of District Competitions, awarding Premiums for Stock to the amount of £10, and reporting their Shows to the Secretary—The Silver Medal for the best Male and for the best Female animal of any Pure Breed.

Applied for by the Forbes and Fordyce Association—Convener, Sir John Stuart Forbes of Pitsligo, Bart.
Western District of Mid-Lothian Association—Convener, Peter M'Lagan of Pumpherston.
Penicuik Society—Convener, the Right Hon Sir George Clerk, Bart.
Buchan Society—Convener, George Baird of Strichen.
Wester Ross Club—Convener, Keith W. Stewart Mackenzie of Seaforth.
Spey, Avon, and Fiddochside Association—Convener, Sir George Macpherson Grant, Bart.
Kilmarnock Society—Convener, Colonel Ferrier Hamilton.
Avondale Society—Convener, J. P. Alston of Muirburn.
Dalbeattie Society—Convener, Wellwood H. Maxwell of Munches.
Black Isle Society—Convener, Sir J. J. R. Mackenzie, Bart.
Fettercairn Club—Convener, Lieutenant-Colonel MacInroy of the Burn.
Mauchline Society—Convener, C. V. H. Campbell of Netherplace.

2. WOOL.—For the best sample of the following wools:—

Laid Cheviot, washed.
Laid Cross, washed.
Laid Blackfaced, unwashed.
Hog, White Cheviot.
White Long.

The Silver Medal for each variety.

Applied for by the Inverness Farmers' Club, and subject to its conditions—Convener, Henry W. White of Monar.

3. For the best managed FARM—The Silver Medal.

Applied for by the Nairnshire Society—Convener, Wm. Alexander Stables, Cawdor Castle.
Inverness Society—Convener, Arthur Forbes of Culloden.
Kincardineshire Club—Convener, Sir John S. Forbes, Bart.
Mauchline Society—Convener, C. V. H. Campbell of Netherplace.

4. For the best managed DAIRY—The Silver Medal.

Applied for by the Mauchline Society—Convener, Colonel Ferrier Hamilton.

5. For the best managed GREEN CROP—The Silver Medal.

Applied for by the Bute Society—Convener, James Muir, Barone Park.
Inverness Society—Convener, Arthur Forbes of Culloden.
Leochel-Cushnie Society—Convener, A. Forbes Gordon of Rayne.
Clackmannan Society—Convener, James Johnstone of Alva.
Fettercairn Club—Convener, Lieut.-Colonel MacInroy of the Burn.
Mauchline Society—Convener, C. V. H. Campbell of Netherplace.
Kincardineshire Club—Convener, Sir John S. Forbes, Bart.

6. For the best managed HAY CROP—The Silver Medal.

Applied for by the Clackmannanshire Society—Convener, James Johnstone of Alva.

7. For the best kept FENCES—The Silver Medal.

   No application.

8. To the Labourer most expert and efficient in opening and filling Drains, and otherwise executing the works necessary in thorough Draining—The Silver Medal.

   No Application.

9. To the most expert Hedge-cutter—The Silver Medal.

   No Application.

The Medals to be issued will be limited to ten in each class, except No. 1.

The Money Premiums given in the District must be £2 in each case, and in No. 1, £10.

Reports of the several Competitions, and applications for Medals in 1864, must be lodged by 1st November next.

CLASS V.

COTTAGES AND GARDENS.

The following Premiums are offered for competition in the Parishes after mentioned. The Medals and one-half of the Premiums are given by the Society, and the other half is contributed by the respective Parishes.

COTTAGES.

1. For the best kept Cottage in each Parish—One Pound Five Shillings; and where there are four Competitors—The Silver Medal.
2. For the second best—One Pound.
3. For the third best—Fifteen Shillings.

GARDENS.

1. For the best kept Cottage Garden in each Parish—One Pound Five Shillings; and where there are four Competitors—The Silver Medal.
2. For the second best—One Pound.
3. For the third best—Fifteen Shillings.

Aberdeenshire.

LEOCHEL-CUSHNIE—Convener, Arthur Forbes Gordon of Rayne.
STRICHEN—Convener, George Baird of Strichen.

Fifeshire.

NEWBURGH and ABDIE—Convener, Dr Lyell, Newburgh.

Stewartry of Kirkcudbright.

URR—Convener, Wellwood H. Maxwell of Munches.*

Lanarkshire.

LAMINGTON—Convener, Alexander Baillie Cochrane of Lamington, M.P.
LESMAHAGOW—Convener, W. E. Hope Vere of Blackwood.
COVINGTON—Convener, Sir Wyndham Carmichael Anstruther, Bart.
DOUGLAS—Convener, Thomas Rennie Scott, Castle Mains.

Perthshire.

St Martins—Convener, William Macdonald Macdonald of St Martins.

Roxburghshire.

Ancrum—Convener, Sir William Scott of Ancrum, Bart., M.P.

Wigtownshire.

Kirkcolm—Convener, David Guthrie, Stranraer.
Leswalt—Convener, Sir Andrew Agnew of Lochnaw, Bart., M.P.
Port-Patrick—Convener, Sir Edward Hunter Blair, Bart.
Old Luce—Convener, Sir John C. Dalrymple Hay of Park Place, Bart.

CONDITIONS.

1. Competitions may take place in the different Parishes for Cottages and Gardens, or for either separately.

2. The occupiers of Gentlemen's Lodges and Gardeners' Houses, as well as Gentlemen's Servants occupying Cottages in the Policies, or on land in the natural possession of their masters, are excluded. The inspection must be completed by the 1st of October. In making the inspection, the Conveners may take the assistance of any competent judge.

3. The annual value of each Cottage, with the ground occupied in the parish by a Competitor, shall not exceed £5 sterling. A Competitor who has gained a Premium in a previous year cannot compete again for the same or a lower Premium.

4. If the Cottage is occupied by the proprietor, the roof must be in good repair; if the roof is of thatch, it must be in good repair, though in the occupation of a tenant. The interior and the external conveniences must be clean and orderly—the windows must be free of broken glass, clean, and affording the means of ventilation. Dunghills, and all other nuisances, must be removed from the front and gables. In awarding the Cottage Premiums, preference will be given to Competitors who, in addition to the above requisites, have displayed the greatest taste in ornamenting the exterior of their houses, and the ground in front and at the gables.

5. In estimating the claims for the Garden Premiums, the Judges should have in view—the sufficiency and neatness of the fences; the cleanness of the ground, and neatness of the walks; the quality of the crops; the general productiveness of the garden; and the choice of crops.

6. Reports, stating the number of Competitors, the names of successful parties, and the nature of the exertions which have been made by them, must be transmitted by the Conveners to the Secretary on or before 1st of November next.

Parishes desirous of these Premiums must lodge applications with the Secretary on or before the 1st November next.

MEDALS FOR COTTAGES OR GARDENS.

The Society will issue annually twelve Medals to local Associations or individuals, who at their own expense establish Premiums for Cottages or Gardens.

The Medals will be issued upon a Report by a Member of the Society, in the terms required by the preceding conditions, describing the merits of the Cottages or Gardens. The Reports to be lodged with the Secretary on or before the 15th October 1863.

Applied for by

The Lanark Horticultural Society.
The Eastern District of Stirling.
The Proprietors of Lundin.
The Parishes of Forglen and Alvah.
The Mauchline Horticultural Society.
The Newburgh Gardening Society.
The Conan and Maryburgh Gardening Society.
The United East Lothian Society.
The Logiealmond and Glenalmond Horticultural Society.
Arthur Forbes Gordon of Rayne.
Archdeacon Bisset of Lessendrum.

IMPROVING EXISTING COTTAGES.

To the Proprietor in Scotland who shall report the Improvement of the greatest number of Cottages in the years 1860, 1861, and 1862—The Gold Medal.

BUILDING NEW COTTAGES.

To the Proprietor in Scotland who shall report the Erection of the greatest number of approved Cottages during the years 1859, 1860, 1861, and 1862—The Gold Medal.

CONDITIONS.

1. Claims for the above Premiums must be lodged with the Secretary on or before the 1st of October next, to allow an inspection to be made of the different Cottages. The inspection will be conducted by a Committee of the Society's Members, and Reports must be transmitted to the Secretary on or before the 1st November.

2. The annual value of the Cottage or Cottages separately, with the garden ground, must not exceed £5.

3. In estimating the claims of Competitors, the following points will be kept

in view:—the external appearance of the Cottages; their internal accommodation; the arrangements of the outhouses; the means of drainage and ventilation; and the expense of the building or of the alteration, compared with its durability and accommodation. When the Cottages of one Competitor are superior in style and comfort to those of another, though not so numerous, the Inspectors will give them the preference, provided they amount at least to three, and have been erected at a moderate expense.

4. Parties competing will forward to the Society Plans, Specifications, and Estimates, of which, and of all information sent therewith, copies may be taken for publication, if the Society shall see fit, and the originals returned to the parties within six months, if desired.

ACCOMMODATION FOR FARM-SERVANTS.

To the Proprietor in Scotland who shall have Erected on his estate the most approved Farm-buildings in reference to the proper accommodation of Farm-servants—The Gold Medal.

Reports, Plans, and Specifications to be lodged by the 1st November 1863.

AGRICULTURAL MEETING

AND

GENERAL SHOW OF STOCK AND IMPLEMENTS,

AT

KELSO,

ON THE 3D, 4TH, 5TH, AND 6TH OF AUGUST 1863.

HIS GRACE THE DUKE OF ARGYLL, K.T.,
President of the Society.

HIS GRACE THE DUKE OF ROXBURGHE, K.T.,
Chairman of the Local Committee.

The District connected with the Show comprises the Counties of BERWICK, ROXBURGH, SELKIRK, and PEEBLES.

GENERAL ARRANGEMENTS.

STOCK

To be entered with the Secretary on or before Friday, 19th June.
Received in the Yard on Monday 3d August, and between 5 and 6 A.M. on Tuesday, 4th August.
Judged at 7 A.M. on Tuesday, 4th August.
Exhibited Tuesday, Wednesday, and Thursday, 4th, 5th, and 6th August.

IMPLEMENTS

To be entered with the Secretary on or before Friday, 19th June.
Received in the Yard on Saturday and Monday, 1st and 3d August.
Exhibited Tuesday, Wednesday, and Thursday, 4th, 5th, and 6th August.

TERMINATION OF SHOW.

THURSDAY, 6th August, at 5 P.M. Stock and Implements may remain in the Yard till Friday afternoon.

The Competition is open to Exhibitors from all parts of the United Kingdom.

Members of the Society are exempted from entry-money of 2½ per cent. on premiums for Stock. They are admitted to the Show-Yard at half-price during the judging of Stock. At other periods they have free access.

PREMIUMS.

CLASS I.—CATTLE.

SHORT-HORN.

Section		
1	Best Bull calved before 1st Jan. 1861,	Twenty Sovereigns.
	Second best,	Ten Sovereigns.
	Third best,	The Bronze Medal.
	Breeder of Best Bull,	The Silver Medal.
2	Best Bull calved after 1st Jan. 1861,	Twenty Sovereigns.
	Second best,	Ten Sovereigns.
	Third best,	The Bronze Medal.
3	Best Bull calved after 1st Jan. 1862,	Ten Sovereigns.
	Second best,	Five Sovereigns.
	Third best,	The Bronze Medal.
4	Best Cow of any age,	Fifteen Sovereigns.
	Second best,	Eight Sovereigns.
	Third best,	The Bronze Medal.
5	Best Heifer calved after 1st Jan. 1861,	Ten Sovereigns.
	Second best,	Five Sovereigns.
	Third best,	The Bronze Medal.
6	Best Heifer calved after 1st Jan. 1862,	Eight Sovereigns.
	Second best,	Four Sovereigns.
	Third best,	The Bronze Medal.

POLLED (ABERDEEN OR ANGUS).

7	Best Bull calved before 1st Jan. 1861,	Twenty Sovereigns.
	Second best,	Ten Sovereigns.
	Third best,	The Bronze Medal.
	Breeder of Best Bull,	The Silver Medal.
8	Best Bull calved after 1st Jan. 1861,	Twenty Sovereigns.
	Second best,	Ten Sovereigns.
	Third best,	The Bronze Medal.
9	Best Bull calved after 1st Jan. 1862,	Ten Sovereigns.
	Second best,	Five Sovereigns.
	Third best,	The Bronze Medal.
10	Best Cow of any age,	Fifteen Sovereigns.
	Second best,	Eight Sovereigns.
	Third best,	The Bronze Medal.
11	Best Heifer calved after 1st Jan. 1861,	Ten Sovereigns.
	Second best,	Five Sovereigns.
	Third best,	The Bronze Medal.
12	Best Heifer calved after 1st Jan. 1862,	Eight Sovereigns.
	Second best,	Four Sovereigns.
	Third best,	The Bronze Medal.

POLLED (GALLOWAY).

Section		
13	Best Bull calved before 1st Jan. 1861,	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Bronze Medal.
	Breeder of Best Bull, ...	The Silver Medal.
14	Best Bull calved after 1st Jan. 1861, .	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Bronze Medal.
15	Best Bull calved after 1st Jan. 1862,	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
16	Best Cow of any age, ...	Fifteen Sovereigns.
	Second best, ...	Eight Sovereigns.
	Third best, ...	The Bronze Medal.
17	Best Heifer calved after 1st Jan. 1861,	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
18	Best Heifer calved after 1st Jan. 1862,	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Bronze Medal.

AYRSHIRE.

19	Best Bull calved before 1st Jan. 1861,	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Bronze Medal.
	Breeder of Best Bull, ...	The Silver Medal.
20	Best Bull calved after 1st Jan. 1861,	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Bronze Medal.
21	Best Cow in Milk of any age, . . .	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
22	Best Cow in Calf of any age, ...	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
23	Best Heifer calved after 1st Jan. 1861,	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
24	Best Heifer calved after 1st Jan. 1862,	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Bronze Medal.

HIGHLAND.

Section		
25	Best Bull calved before 1st Jan. 1860,	Twenty Sovereigns.
	Second best,	Ten Sovereigns.
	Third best	The Bronze Medal.
	Breeder of Best Bull,	The Silver Medal.
26	Best Bull calved after 1st Jan. 1860,	Twenty Sovereigns.
	Second best,	Ten Sovereigns.
	Third best,	The Bronze Medal.
27	Best Cow of any age,	Ten Sovereigns.
	Second best,	Five Sovereigns.
	Third best,	The Bronze Medal.
28	Best Heifer calved after 1st Jan. 1860,	Ten Sovereigns.
	Second best,	Five Sovereigns.
	Third best	The Bronze Medal.
29	Best Heifer calved after 1st Jan. 1861,	Eight Sovereigns.
	Second best,	Four Sovereigns.
	Third best,	The Bronze Medal.

FAT STOCK.

30	Best Ox of any Pure or Cross breed calved after 1st Jan. 1860,	Medium Gold Medal.
	Second best,	The Silver Medal.
	Third best,	The Bronze Medal.
31	Best Ditto, after 1st Jan. 1861,	Medium Gold Medal.
	Second best,	The Silver Medal.
	Third best,	The Bronze Medal.
32	Best Ditto, after 1st Jan. 1862,	Medium Gold Medal.
	Second best,	The Silver Medal.
	Third best,	The Bronze Medal.
33	Best Highland Ox calved after 1st Jan. 1859,	Medium Gold Medal.
	Second best,	The Silver Medal.
	Third best,	The Bronze Medal.
34	Best Ditto, after 1st Jan. 1860,	Medium Gold Medal.
	Second best,	The Silver Medal.
	Third best,	The Bronze Medal.
35	Best Cross Heifer calved after 1st Jan. 1861,	Medium Gold Medal.
	Second best,	The Silver Medal.
	Third best,	The Bronze Medal.
36	Best Ditto, after 1st Jan. 1862,	Medium Gold Medal.
	Second best,	The Silver Medal.
	Third best,	The Bronze Medal.

CLASS II.—HORSES

FOR AGRICULTURAL PURPOSES.

Section		
1	Best Stallion foaled before 1st Jan. 1860, ...	Thirty Sovereigns.
	Second best, ...	Fifteen Sovereigns.
	Third best, ...	The Bronze Medal.
	Breeder of best Stallion, ...	The Silver Medal.
2	Best Entire Colt foaled after 1st Jan. 1860, ...	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Bronze Medal.
3	Best Entire Colt foaled after 1st Jan. 1861, ...	Fifteen Sovereigns.
	Second best, ...	Eight Sovereigns.
	Third best, ...	The Bronze Medal.
4	Best Entire Colt foaled after 1st Jan. 1862, ...	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
5	Best Mare (with Foal at foot) foaled before 1st Jan. 1860, ...	Twenty Sovereigns.
	Second best, ...	Ten Sovereigns.
	Third best, ...	The Bronze Medal.
6	Best Mare (in foal) foaled before 1st Jan. 1860, ...	Fifteen Sovereigns.
	Second best, ...	Eight Sovereigns.
	Third best, ...	The Bronze Medal.
7	Best Filly foaled after 1st Jan. 1860,	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
8	Best Filly foaled after 1st Jan. 1861,	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Bronze Medal.
9	Best Filly foaled after 1st Jan. 1862,	Six Sovereigns.
	Second best, ...	Three Sovereigns.
	Third best, ...	The Bronze Medal.

EXTRA.

10 Best thorough-bred Horse to serve in the District, Fifty Sovereigns.

CLASS III.—SHEEP.

LEICESTER.

Section		
1	Best Tup not more then four shear, .	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
2	Best Dinmont or Shearling Tup, . .	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
3	Best five Ewes not above four shear,	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Bronze Medal.
4	Best five Shearling Ewes or Gimmers,	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Bronze Medal.

CHEVIOT.

5	Best Tup not more than four shear, .	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
6	Best Dinmont or Shearling Tup, . .	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
7	Best five Ewes not above four shear,	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Bronze Medal.
8	Best five Shearling Ewes or Gimmers,	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Bronze Medal.

BLACKFACED.

9	Best Tup not more than four shear, .	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
10	Best Dinmont or Shearling Tup, . .	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
11	Best five Ewes not above four shear,	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Bronze Medal.

Section		
12	Best five Shearling Ewes or Gimmers,	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Bronze Medal.

SOUTHDOWN.

13	Best Tup not more than four shear, .	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
14	Best Dinmont or Shearling Tup, . .	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
15	Best five Ewes not above four shear,	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Bronze Medal.
16	Best five Shearling Ewes or Gimmers,	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Bronze Medal.

LONG-WOOLLED OTHER THAN LEICESTER.

17	Best Tup not more than four shear, .	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
18	Best five Gimmers or Ewes not more than four shear, ...	Eight Sovereigns.
	Second	Four Sovereigns.
	Third, ...	The Bronze Medal.

SHORT-WOOLLED OTHER THAN SOUTHDOWN.

19	Best Tup not more than four shear, .	Ten Sovereigns.
	Second best, ...	Five Sovereigns.
	Third best, ...	The Bronze Medal.
20	Best five Gimmers or Ewes not more than four shear, ...	Eight Sovereigns.
	Second best, ...	Four Sovereigns.
	Third best, ...	The Bronze Medal.

EXTRA.

21	Best five Shearling Wethers of any Cross, ...	Medium Gold Medal
	Second best, ...	The Silver Medal.
	Third best, ...	The Bronze Medal.

CLASS IV.—SWINE.

Section		
1	Best Boar, large Breed,	Eight Sovereigns.
	Second best,	Four Sovereigns.
	Third best,	The Bronze Medal.
2	Best Boar, small breed,	Eight Sovereigns.
	Second best,	Four Sovereigns.
	Third best,	The Bronze Medal.
3	Best Sow, large breed,	Six Sovereigns.
	Second best,	Three Sovereigns.
	Third best,	The Bronze Medal.
4	Best Sow, small breed,	Six Sovereigns.
	Second best,	Three Sovereigns.
	Third best,	The Bronze Medal.
5	Best Pen of three Pigs, not exceeding 8 months old, large breed,	Four Sovereigns.
	Second best,	Two Sovereigns.
	Third best,	The Bronze Medal.
6	Best Pen of three Pigs, not exceeding 8 months old, small breed,	Four Sovereigns.
	Second best,	Two Sovereigns.
	Third best,	The Bronze Medal.

EXTRA STOCK.

Stock not included in the Sections for Competition may be exhibited as Extra, and will receive Honorary Premiums when specially commended.

CLASS V.—POULTRY.

COLOURED DORKING.

Section		
1	Best Cock and 2 Hens,	The Silver Medal.
	Second best,	The Bronze Medal.
2	Best Cockerel and 2 Pullets,	The Silver Medal.
	Second best,	The Bronze Medal.
	WHITE DORKING.	
3	Best Cock and 2 Hens,	The Silver Medal.
	Second best,	The Bronze Medal.
4	Best Cockerel and 2 Pullets,	The Silver Medal.
	Second best,	The Bronze Medal.
	COLOURED COCHIN-CHINA.	
5	Best Cock and 2 Hens,	The Silver Medal.
	Second best,	The Bronze Medal.
6	Best Cockerel and 2 Pullets,	The Silver Medal.
	Second best,	The Bronze Medal.

SECTION

WHITE COCHIN-CHINA.

7	Best Cock and 2 Hens,	The Silver Medal.
	Second best,	The Bronze Medal.
8	Best Cockerel and 2 Pullets,	The Silver Medal.
	Second best,	The Bronze Medal.

BRAMAHPOOTRA.

9	Best Cock and 2 Hens,	The Silver Medal.
	Second best,	The Bronze Medal.
10	Best Cockerel and 2 Pullets,	The Silver Medal.
	Second best,	The Bronze Medal.

MALAY.

11	Best Cock and 2 Hens,	The Silver Medal.
	Second best,	The Bronze Medal.
12	Best Cockerel and 2 Pullets,	The Silver Medal.
	Second best,	The Bronze Medal.

SPANISH.

13	Best Cock and 2 Hens,	The Silver Medal.
	Second best,	The Bronze Medal.
14	Best Cockerel and 2 Pullets,	The Silver Medal.
	Second best,	The Bronze Medal.

GOLDEN HAMBURG.

15	Best Cock and 2 Hens,	The Silver Medal.
	Second best,	The Bronze Medal
16	Best Cockerel and 2 Pullets,	The Silver Medal.
	Second best,	The Bronze Medal

SILVER HAMBURG.

17	Best Cock and 2 Hens,	The Silver Medal.
	Second best,	The Bronze Medal.
18	Best Cockerel and 2 Pullets,	The Silver Medal.
	Second best,	The Bronze Medal.

POLISH.

19	Best Cock and 2 Hens,	The Silver Medal.
	Second best,	The Bronze Medal.
20	Best Cockerel and 2 Pullets,	The Silver Medal.
	Second best,	The Bronze Medal.

Section		
	Game.	
21	Best Cock and 2 Hens, ...	The Silver Medal.
	Second best, ...	The Bronze Medal.
22	Best Cockerel and 2 Pullets, . . .	The Silver Medal.
	Second best, ...	The Bronze Medal.
	Any other Breed.	
23	Best Cock and 2 Hens, ...	The Silver Medal.
	Second best, ...	The Bronze Medal.
24	Best Cockerel and 2 Pullets, . . .	The Silver Medal.
	Second best, ...	The Bronze Medal.
	Bantams.	
25	Best Cock and 2 Hens, ...	The Silver Medal.
	Second best, ...	The Bronze Medal.
26	Best Cockerel and 2 Pullets, . . .	The Silver Medal.
	Second best, ...	The Bronze Medal.
	Capons—*Of any Breed.*	
27	Best 3 Capons, ...	The Silver Medal.
	Second best, ...	The Bronze Medal.
	Ducks—*White Aylesbury.*	
28	Best Drake and 2 Ducks, ...	The Silver Medal.
	Second best, ...	The Bronze Medal.
	Ducks—*Rouen.*	
29	Best Drake and 2 Ducks, ...	The Silver Medal.
	Second best, ...	The Bronze Medal.
	Ducks—*Any other Breed.*	
30	Best Drake and 2 Ducks, ...	The Silver Medal.
	Second best, ...	The Bronze Medal.
	Turkeys—*Black Norfolk.*	
31	Best Cock and 2 Hens, ...	The Silver Medal.
	Second best, ...	The Bronze Medal.
	Turkeys—*Any other Breed.*	
32	Best Cock and 2 Hens, ...	The Silver Medal.
	Second best, ...	The Bronze Medal.
	Geese.	
33	Best Gander and 2 Geese, ...	The Silver Medal.
	Second best, ...	The Bronze Medal.

CLASS VI.—IMPLEMENTS.

Note.—Premiums for Implements and Machinery have been withdrawn, and trials during the currency of a Show are to be discontinued, in terms of a report approved of by a General Meeting of the Society on 21st January 1863. [Reference is made to General Regulations 35, 36, and 37, for the terms on which Implements may now be exhibited, and the conditions under which they will be tried and rewarded.

REGULATIONS.

GENERAL CONDITIONS.

1. Members of the Society are admitted to the Show-Yard without payment on exhibiting a "*Member's Ticket*," except during the inspection by the Judges, when 5s. will be charged. Tickets will be sent to all Members residing in the District connected with the Show—the counties of Berwick, Roxburgh, Selkirk, and Peebles. Members residing in other localities must apply for Tickets at the Secretary's Office, 6 Albyn Place, Edinburgh, *not later than the 25th of July*.

2. Stock must be the property, and in the possession, of the Exhibitor from the date of the Certificate of Entry, and the exact age must be stated in the Certificate.

3. Evidence may be required that Stallions and Bulls have had produce.

4. All Cows must have had Calves previous to the Show, and when exhibited, they must either be in milk or in calf; if in milk, birth must have been within 9 months previous to the Show; if in calf, birth must be certified within 4 months after the Show.

5. Heifers in Section 5 (two-year-old Short-horn Heifers), must be in calf when exhibited, and birth must be certified within 9 months after the Show.

6. Mares in Section 5 must have produced foals after 1st January 1863, and foals must be at foot, except when death can be proved. Mares in Section 6 must be in foal, and awards will be suspended till birth is certified.

7. The prize thoroughbred Horse in Section 10 shall be bound to serve mares within the district, subject to the regulations of the local Committee. The number of mares not to exceed eighty, and five pounds to be paid for each.

8. Ewes and Gimmers must be taken from regular breeding flocks, and Ewes must have reared Lambs in 1863.

9. An animal which has gained a first premium at a General Show of the Society cannot again compete in the same class, but the Medium Gold Medal will be awarded to any animal exhibited as extra Stock, which has previously obtained the Society's first Premium as an aged Stallion, Bull, or Cow.

10. No animal shall bear on its rug, harness, pail, or other fittings, any

initial, crest, or other mark of ownership, nor be distinguished otherwise than by the number indicating its place in the Catalogue.

11. Except for extra Stock, Commendations will only be given for one lot in each Section—the fourth in merit.

12. The violation by an Exhibitor of any one of the Regulations will involve the forfeiture of all Premiums awarded to him.

13. Should it be proved to the satisfaction of the Directors that an animal has been entered under a false name, pedigree, or description, for the purpose of misleading the Directors or Judges as to its qualification or properties, the case shall be reported to the first General Meeting, in order that the Exhibitor shall be disqualified from again competing at the Society's Shows, and his name, if he be a Member, struck from the roll.

14. When an animal has previously been disqualified by the decision of any Agricultural Association in Great Britain or Ireland, such disqualification shall attach, if the Exhibitor, being aware of the disqualification, fail to state it and the grounds thereof, in his entry, to enable the Directors to judge of its validity.

15. Protests against the awards of the judges must be lodged with the Secretary not later than Ten A.M. on Wednesday, 5th August, and parties must be in attendance at the Committee-room, in the Show-Yard, at Eleven, when protests will be disposed of.

16. The Society will not be liable for any loss or damage which Stock, Implements, or other articles may sustain at the Show, or in consequence of having been sent to it.

17. The decisions of the Judges, as confirmed by the Directors, are final, and no appeal is competent.

18. The Premiums awarded will be paid after the 1st November 1863.

CERTIFICATES OF ENTRY FOR STOCK.

19. Every Lot must be intimated by a Certificate of Entry lodged *not later than the 19th of June.* Printed forms will be issued on application to the Secretary, or to Robert Curry, Esq., Kelso, the local secretary.

20. The Secretary will attend at Kelso on the 18th and 19th of June, to close the entries.

21. Admission-orders to the Yard for Stock and Servants will be forwarded by post previous to the Show.

ENTRY-MONEY FOR STOCK.

22. Exhibitors, not Members of the Society, shall pay as Entry-Money for each lot of Stock 2½ per cent. on the highest Premium for which the Entry is made. Members may show three lots of Stock in each Section free, but must pay the same percentage on the Premium for each additional lot. The Entry-Money for Poultry is 2s. 6d. on each lot, and Members may show two lots free in each Section.

STALL RENT.

23. Covered accommodation will be provided for the whole of the Stock, and the following rates shall be paid by *all* Exhibitors at the time of making their Entries:—

	s.	d.
Stallions, 3 year old, and 2 year old Entire Colts.........	10	0
All other Horses and Cattle 2 years old and upwards....	7	6
Yearling Colts, Fillies, Bulls, and Heifers	5	0
Sheep and Swine, per pen..	5	0
Poultry, per coop...	2	6

ADMISSION OF STOCK.

24. The Yard will be open for Stock on Monday 3d August, and between Five and Six o'clock on the morning of the 4th. No Stock will be admitted after that hour.

25. No Exhibitor shall be permitted to remove Cattle, Sheep, or Swine from the Yard till Five P.M. on Thursday 6th August, except on certificate by the Veterinary Surgeon employed by the Directors.

26. Horses may be withdrawn at Six each evening on a deposit of £2 for each animal, which shall be forfeited if the animal is not brought back at Six o'clock the following morning. Orders for withdrawal must be applied for, and deposits lodged at the Secretary's Office in the Show Yard, between the hours of 4 and 6 P.M.

27. Servants in charge of Stock must bring their own buckets or pails. A first bedding for Horses, Cattle, and Swine, will be provided by the Society, but all other fodder and food for Stock will be supplied, at fixed prices hereafter to be published, by a Contractor employed by the Society.

PLACING AND JUDGING STOCK.

28. A Special committee will superintend the placing of Stock. Exhibitors may see their Stock properly placed, but they must immediately thereafter retire; and on no pretext shall any other parties be permitted to enter the Yard until it is opened to the public.

29. One servant will be admitted with each lot. Bulls must be secured by a ring or screw in the nose, with a chain or rope attached. Stock shall be distinguished by numbers, and the owner's name must not be mentioned till the Premiums are decided.

30. The Judges will commence their inspection at Seven o'clock on Tuesday, 4th August. They shall decide without inquiry as to the names of parties or places, and with reference merely to the numbers which distinguish the animals. In no case shall a Premium be awarded unless the Judges deem the animals to have sufficient merit, more especially if there is only one lot in the Section; and it shall be in their power to suggest the removal of any lot which appears to them unworthy of being placed in the Yard.

31. A Member of Committee will attend each Section of the Judges. It will be his duty to see that no obstruction is offered to them; that the space reserved for them is not encroached on; to communicate to the Secretary any question that may arise for the consideration of the Committee; to complete their reports; and to ticket the prize animals.

32. It shall not be competent for any Exhibitor, nor for his Factor or Land-Steward, to act as a Judge or Attending Member in any class in which he is competing; and no Exhibitor shall remain in charge of any lot, whether belonging to himself or another, while the Judges are in the Yard.

ADMISSION OF PUBLIC.

33. The public will be admitted to the Stock Yard on Tuesday at 7.30, immediately after the Judges have been conducted to their several stations, and before the inspection commences. Holders of Members' tickets, and Exhibitors of Stock, shall pay 5s. for admission to the judging; all others shall pay 10s. The space reserved for the judges will be enclosed by ropes, and no encroachment will be permitted.

34. After 2 P.M. on Tuesday, Holders of Members' Tickets will be admitted free. The charges to others will be, on Tuesday after 2 P.M., 2s. 6d.; on Wednesday, from 8 A.M. till 1 P.M., 2s. 6d.; and after 1 a Shilling; on Thursday from 8 A.M. till 5 P.M., a Shilling. The Implement Yard will be open on Tuesday forenoon while the Stock is being judged. Holders of Members' Tickets free; others at 2s. 6d.

ENTRY OF IMPLEMENTS.

35. All articles must be entered with the Secretary on or before 19th June, and Exhibitors shall intimate whether they wish their goods placed under cover or not, and specify the space they require. The price of shedding, per lineal foot of frontage, with a depth of 20 feet, shall be 1s. 6d. to Members, and 2s. to Non-members.

36. Members may show Implements free if shedding is not required, and Non-members will be charged from 2s. to 10s., according to space occupied.

37. When an Implement or Machine is supposed to embrace a new invention, or radical improvement, the nature of either must be specified in the entry, to enable the Directors to order an inspection with a view to a trial. Such trial, when recommended by the inspecting Committee, will be instituted in a convenient locality, and at a season of the year suitable for the operation of the implement or machine, which, when thoroughly tested, will be entitled to such a Premium as the Directors may see fit to award, on the report of the Judges employed by them.

PLACING IMPLEMENTS IN THE YARD.

38. The Yard will be open for the reception of Implements on Saturday and Monday, 1st and 3d August, and the public will be admitted at 10 A.M. on the 4th.

39. There must be attached to each Implement, when forwarded to the Show, a label bearing the Exhibitor's name, and that of the Implement.

40. The articles of each Exhibitor shall be all placed in one stand.

41. All articles must remain in the Yard till Five P.M. on Thursday the 6th August, and may be kept there till the afternoon of Friday.

PLACING AND JUDGING POULTRY.

42. Poultry must be brought to the Show-Yard on Monday 3d August. No lot will be admitted without an Admission-order. Coops, food, and attendance will be found by the Society.

43. No lot to be removed from the Yard till Five o'clock on Thursday the 6th August.

Premium Lists, Certificates of Entry, and Regulations, may be obtained by applying at the Secretary's Office, No. 6 Albyn Place, Edinburgh, or to ROBERT CURRY, Esq., Kelso.

The Secretary will attend at Kelso, on Thursday and Friday 18th and 19th June, to close the entries.

AGRICULTURAL MEETING,

AND

GENERAL SHOW OF STOCK AND IMPLEMENTS,

At STIRLING, in 1864.

CATTLE.

Premiums in Money will be offered for the following Classes :—

SHORT-HORN.

Bulls calved before 1st January 1862
Bulls calved after 1st January...............1862
Bulls calved after 1st January...............1863
Cows of any age.
Heifers calved after 1st January............1862
Heifers calved after 1st January............1863

POLLED (ANGUS OR ABERDEEN).

Bulls calved before 1st January 1862
Bulls calved after 1st January...............1862
Bulls calved after 1st January...............1863
Cows of any age.
Heifers calved after 1st January............1862
Heifers calved after 1st January............1863

POLLED (GALLOWAY).

Bulls calved before 1st January 1862
Bulls calved after 1st January...............1862
Bulls calved after 1st January...............1863
Cows of any age.
Heifers calved after 1st January............1862
Heifers calved after 1st January............1863

AYRSHIRE.

Bulls calved before 1st January 1862
Bulls calved after 1st January................1862
Cows in Milk of any age.
Cows in Calf of any age.
Heifers calved after 1st January............1862
Heifers calved after 1st January............1863

HIGHLAND.

Bulls calved before 1st January 1861
Bulls calved after 1st January...............1861
Cows of any age.
Heifers calved after 1st January............1861
Heifers calved after 1st January............1862

EXTRA STOCK.

Medals will be offered for the following Extra Classes of Cattle.

Oxen of any pure or cross breed calved after 1st January 1861
Oxen of any pure or cross breed calved after 1st January 1862
Oxen of any pure or cross breed calved after 1st January 1863
Highland Oxen calved after 1st January 1860
Highland Oxen calved after 1st January 1861
Cross-bred Heifers calved after 1st January 1862
Cross-bred Heifers calved after 1st January......................1863

HORSES

For Agricultural Purposes.

Stallions foaled before 1st January.....................1861
Entire Colts foaled after 1st January..................1861
Entire Colts foaled after 1st January..................1862
Entire Colts foaled after 1st January..................1863
Mares with foal at foot, foaled before 1st January 1861
Mares in foal, foaled before 1st January..............1861
Fillies foaled after 1st January..........................1861
Fillies foaled after 1st January...........................1862
Fillies foaled after 1st January...........................1863

SHEEP.

LEICESTER.

Tups not more than four shear.
Dinmont or Shearling Tups.
Ewes not more than four shear.
Shearling Ewes or Gimmers.

CHEVIOT.

Tups not more than four shear.
Dinmont or Shearling Tups.
Ewes not more than four shear.
Shearling Ewes or Gimmers.

BLACKFACED.

Tups not more than four shear.
Dinmont or Shearling Tups.
Ewes not more than four shear.
Shearling Ewes or Gimmers.

SOUTHDOWN.

Tups not more than four shear.
Dinmont or Shearling Tups.
Ewes not more that four shear.
Shearling Ewes or Gimmers.

LONG-WOOLLED OTHER THAN LEICESTER.

Tups not more than four shear.
Gimmers, or Ewes not more than four shear.

SHORT-WOOLLED OTHER THAN SOUTHDOWN.

Tups not more than four shear.
Gimmers, or Ewes not more than four shear.

NOTE.—*Ewes and Gimmers to be exhibited in pens of five.*

SWINE.

Boars, large breed.	Sows, large breed.
Boars, small breed.	Sows, small breed.

Pigs not exceeding 8 months old, large breed.
Pigs not exceeding 8 months old, small breed.

AGRICULTURAL EDUCATION.

The following Bye-Laws have been enacted under the authority of the Supplementary Charter of 1856, and in terms of the Report by the Council on Education thereby created:—

1. That in terms of a Report by the Council on Education, the following Board of Examiners be appointed:—

Science and Practice of Agriculture—Mechanics and Agriculture of the Farm—Professor JOHN WILSON; GEORGE HOPE, Fenton Barns; ROBERT RUSSELL, Pilmuir; and JOHN WILSON, Edington Mains.
Botany—Professor BALFOUR.
Chemistry—Professor THOMAS ANDERSON.
Natural History—Professor ALLMAN.
Veterinary Surgery—Professor DICK.
Field Engineering and Surveying—JOHN MILLER of Leithen, C.E., and JAMES STIRLING, C.E.
Book-keeping and Accounts—KENNETH MACKENZIE, Accountant, and PETER M'LAGAN of Pumpherston.

2. That it shall be competent for said Board from time to time to receive for examination, and to recommend for the Society's Agricultural Diploma, Candidates who shall have attained their 21st year, and who shall exhibit the vouchers, and pass an examination on the subjects hereinafter prescribed.

3. That the vouchers to be exhibited shall be such as to afford satisfactory evidence to the Board: *1st*, That the Candidate has attended a farm, and been engaged in the practical operations thereof, for a period of two years, or for two separate periods of not less than one year each. *2dly*, That the Candidate has attended, for another period of two years, or for separate periods of not less than one year each, the following Classes in some seminary recognised by the Board as sufficient:—Agriculture, Chemistry, Natural History, Botany, Veterinary Medicine, and Surgery.

4. That the Candidate's knowledge of practical husbandry, and of the foregoing branches of study, as well as of Field Engineering and Surveying, Farm Mechanics and Architecture, and Book-keeping, shall be established to the satisfaction of the Board by means of a strict examination.

5. That upon a report made by the Board to the Council on

Education, stating that a Candidate has exhibited the vouchers and passed the examination required, the Council shall issue, in favour of such Candidate, a diploma, bearing the corporate seal of the Society, and certifying his proficiency in the arts and sciences connected with agriculture.

VETERINARY COLLEGE.

This establishment is conducted by Professor Dick, assisted by Dr Allen Dalzell, Dr Young, Mr Strangeways, and Mr Worthington. The curriculum embraces the Principles and Practice of Veterinary Medicine and Surgery, with Anatomy, Physiology, and Demonstrations; Chemistry; Materia Medica and Dietetics; and the general management of domesticated Animals.

Students have the advantage of assisting in an extensive practice, and of performing the different operations which most frequently occur.

Attendance on Two Courses is required before a Student is taken upon trial for diploma; the examinations are conducted by leading members of the Medical Faculty, and of the Veterinary Profession; Graduates of the College are eligible for appointment as Veterinary Surgeons in Her Majesty's Service.

The Session commences in the beginning of November, and is concluded before the end of April following.

MUSEUM.

The Museum, George IV. Bridge, is open from eleven till four o'clock every day, except Monday. The public are admitted on inscribing their names in the Visitor's Book. Persons desirous of preserving objects illustrative of the Vegetable products of the country are invited to transmit them to the Secretary.

CHEMICAL DEPARTMENT.

The objects of the Chemical Department are twofold:—

I. The prosecution of Researches in various subjects connected with Agricultural Chemistry, the results of which are published at intervals in the Transactions.

Dr Anderson will be glad at all times to receive suggestions from Members of the Society regarding subjects they may consider worthy of investigation, and which will be laid before the Chemical Committee.

II. The performance of Analyses of Manures, Soils, Vegetable Products, &c., for Members of the Society, at reduced fees.

In purchasing manures, cattle foods, &c., Members are recommended, in all cases, to do so by guaranteed analysis, and to ascertain that the article delivered corresponds with it. Partial analyses, such as Nos. 6 and 7 of the accompanying List, will generally suffice to check the correspondence of the stock with the guarantee, and give an *approximate*, though not a precise estimate of its value. When an *exact* estimate is required, a complete analysis is necessary.

Samples intended for analysis should be sent (carriage paid) addressed to Dr ANDERSON, 15 SHUTTLE STREET, GLASGOW; and when of small size, they are most cheaply and expeditiously forwarded *by post*. They should be distinctly labelled, marked with the name and address of the sender in full, and accompanied by a letter, specifying the particular analysis required, according to its number in the following List,—and, if possible, the object in view,—as, by doing so, much trouble and delay will occasionally be saved.

Much inconvenience having been experienced by persons sending samples for Analysis which had not been selected with sufficient care, and were afterwards found not to represent the average composition of the substance, it is particularly requested that the following instructions may be attended to as closely as circumstances will permit:—

INSTRUCTIONS FOR SELECTING SAMPLES FOR ANALYSIS.

Manures.—A large double handful of the Manure should be taken from each of *at least* five or six different bags; and if any lumps are found in it, a due proportion of these should also be taken. The whole being laid on a large sheet of paper, should be carefully mixed by rubbing with the hand, the lumps being broken

down and mixed as uniformly as possible with the powdery part. If this mixture be carefully made, a quantity of it not exceeding *two ounces* will suffice for the analysis. It should be folded up in tinfoil, to prevent its becoming dry, and is most cheaply and expeditiously forwarded by post. In default of tinfoil, the sample may be wrapped in double folds of strong writing-paper. Should the manure contain stones, or be very moist, or should any difficulty be experienced in making a uniform mixture, it is desirable that *two or three pounds* should be sent.

Soils.—In selecting Soils for analysis, five or six spadefuls should be taken from different parts of the field, and, after being spread out in a thin layer for several days to dry, should be put two or three times through a fine sieve, so as to insure uniform mixture. For a complete analysis, not less than *two pounds* should be sent: for a partial analysis, three or four ounces will be sufficient.

Waters.—For the complete analysis of a Water, from *two to three gallons* are required; for the determination of the amount of salts in solution, and lime thrown down by boiling, *two quarts* will suffice. A well-water may be selected at any time; but the water of a spring or running stream should be taken in dry weather. The jars or bottles in which they are sent must be tightly corked and sealed. In the analysis of a mineral water, it may sometimes be desirable to determine the amount of gases held in solution; in which case certain precautions must be observed which require the presence of a chemist at the spring.

Limestones, Clays, Ironstones, &c.—If the bed of any of these substances of which the analysis is required be very uniform in appearance, a piece of two or three ounces weight, taken from any part of it, will be enough for analysis; but in all cases it is better to send three or four chips from different parts of its thickness. Sometimes, where the characters of different parts of the bed vary much, separate analyses of these portions may be requisite, in which case two ounces of each may be sent.

The following are the rates at which Analyses, &c., are furnished to *Members of the Society*, and it is requested that the fee be remitted along with the sample:—

1. Complete analysis of a Soil, including determination of Alkalies and Phosphates, £3.
2. A partial analysis of a Soil, such as the determination of the quantity of Organic Matter, and relative proportion of Clay, Sand, and Carbonate of Lime it contains, 10s.
3. Quantitative determination of any one ingredient of a Soil, 7s. 6d.

4. Complete analysis of Saline Manures and other substances, such as Gypsum, Nitrates of Soda and Potash, Ammoniacal Salts, Guano, Oilcake, Bone-dust, Rape-dust, Superphosphate of Lime, £1.
5. Testing the above substances for adulterations,—for each sample, 5s.

   This examination is generally sufficient to determine whether or not any of these substances are grossly adulterated, but it gives no idea of the comparative value of different Samples, where all are genuine.
6. Determination of the percentage of Phosphates and Ammonia in a Guano, 10s.
7. Determining the quantity of Soluable and Insoluable Phosphates in a Superphosphate, 10s.

   This and the preceding determination generally suffice to show whether the sample is of fair quality, and corresponds with the analysis by which it was sold, but not to fix its exact commercial value.
8. Complete analysis of Limestones, Marls, Shell-sands, &c., £1.
9. Examining any of the above substances for the quantity of Lime, and ascertaining in the same the presence of Magnesia and Alumina, 7s. 6d.

   Ascertaining the proportion of these, 2s. 6d. additional for each substance.
10. Complete analysis of the Ashes of any Plant, £3.
11. Complete analysis of a Water, £2.
12. Determination of the amount of Salts in Solution, and of the Lime thrown down by boiling in any water, 10s.
13. Analysis of Tile or Fire Clay, £1, 10s.
14. Complete analysis of Roots, Grains, and other Vegetable Products, £1.
15. Examining products of Vegetation, or of the Dairy, such as Nutritive Matters in Wheat, or other grain—quantity of Butter or Cheese in Milk—5s. for each ingredient.
16. Determination of the quantity of Nitrogen in any substance, 7s. 6d.
17. Answers to letters asking advice on subjects within the department of the Chemist, 5s.

The charges for other Analyses not specified in the list will be settled by the Committee of Management, with reference to the amount of work which they involve, and a scale similar to the above.

JN. HALL MAXWELL, *Secretary.*

EDINBURGH, 6 ALBYN PLACE,
14th February 1863.

LIST OF MEMBERS

OF

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND,

1863.

ALPHABETICALLY ARRANGED, AND DISTINGUISHING THE YEAR OF ADMISSION.

The Members marked * have been Presidents; and † Vice-Presidents.

New Members are admitted at the Annual Meeting in January, and the Summer General Meeting in June or July. The ordinary subscription is £1, 3s. 6d. annually, which may be redeemed by one payment, varying from £12, 12s. to £7, 1s., and regulated by the number of previous annual payments. Tenant Farmers, Secretaries and Treasurers of local Agricultural Associations, resident Agricultural Factors, and Proprietors farming the whole of their own lands, whose assessment on the valuation-roll does not exceed £500, are admitted on a subscription of 10s. annually, or £5, 5s. for life.

EDINBURGH:
PRINTED BY NEILL AND COMPANY.
MDCCCLXIII.

LIST OF MEMBERS.

	Admitted
His Majesty NAPOLEON III., Emperor of the French, *Honorary Associate*	1856

	*ARGYLL, His Grace George, Duke of, K.T., President of the Society	1844
	*ATHOLE, His Grace George, Duke of, K.T.	1834
	ATHOLE, Her Grace Ann, Duchess of	1841
	ABERCORN, The Most Noble James, Marquis of, K.G.	1833
	†AILSA, The Most Noble Archibald, Marquis of, K.T.	1847
	†AIRLIE, The Right Hon. David, Earl of	1852
	ABERDEEN, The Right Hon. George, Earl of	1848
	ARBUTHNOTT, The Right Hon. John, Viscount	1833
10	ABERCROMBY, The Right Hon. George, Lord	1862
	ARBUTHNOTT, General the Hon. Sir Hugh, M.P.	1811
	ARDMILLAN, The Hon. Lord	1853
	AGNEW, Sir Andrew of Lochnaw, Bart., M.P.	1850
	ABERCROMBY, Sir George S., of Birkenbog, Bart.	1850
	ABERCROMBY, Lady, of Birkenbog	1840
	ANSTRUTHER, Sir Wyndham Carmichael, of Anstruther and Carmichael, Bart.	1842
	ANSTRUTHER, Sir Ralph Abercrombie, of Balcaskie and Watten, Bart.	1832
	ANTROBUS, Sir Edmond, of Rutherford, Bart.	1829
	ARBUTHNOT, Sir Robert Keith, Bart.	1852
20	ALISON, Sir Archibald, Bart., Sheriff of Lanarkshire	1838
	ALEXANDER, Sir James Edward, of Westerton	1831
	ANDERSON, Sir James, Glasgow	1843
	Abercromby, Alexander, Glasgow	1844

		Admitted
	Adair, John, of Genoch, Stranraer	1829
	Adam, Alexander Forsyth, W.S., Edinburgh	1859
	Adam, Alexander, of Lynegar, Thurso	1862
	Adam, Æneas, Humberston, Dingwall	1855
	Adam, James, S.S.C., Edinburgh	1842
	Adam, James Graham, Denovan Field, Denny	1839
30	Adam, John, Closeburn, Thornhill	1860
	Adam, Stephen, Wool-Merchant, Leith	1856
	Adam, William, of Ranna, Advocate, Aberdeen	1839
	Adam, William, Bush, Banchory	1857
	Adam, William Patrick, of Blair-Adam, M.P.	1853
	Adams, John, junior, S.S.C., Edinburgh	1860
	Adamson, James, Morphie, Montrose	1850
	Adamson, Laurence, Bankhead, Leven	1858
	Adamson, Samuel, of Drumclyre, Dumfries	1859
	Addie, Robert, of Viewpark, Uddingston	1844
40	Adie, Alexander James, Linlithgow	1859
	Agnew, Robert Vans, of Sheuchan, Stranraer	1843
	Aiken, Alexander, Meikle Endovie, Alford	1858
	Aikman, Thomson, Glasgow	1857
	Ainslie, David, of Costerton, Blackshiels	1859
	Ainslie, John, Hillend, Pentland, Loanhead	1848
	Ainslie, Robert, of Elvingston, Gladsmuir	1853
	Ainslie, William, Moat, Roslin	1857
	Aitchison, James, of Alderston, Haddington	1822
	Aitchison, James, Proney Mains, Dornoch	1851
50	Aitchison, Lieut.-General John, London	1852
	Aitchison, William, Linhope, Hawick	1835
	Aitken, Alexander, Bladnoch, Wigtown	1857
	Aitken, George, Tyrie, Kirkcaldy	1861
	Aitken, James, of Beechwood, Partick	1857
	Aitken, James, of Gartcows, Falkirk	1834
	Aitken, James, Sunnyside, Prestonkirk	1854
	Aitken, John, Brucehill of Cardross, Stirling	1861
	Aitken, Robert, Skeroblinraid, Campbeltown	1857
	Aitken, Thomas, Leith	1860
60	Aitken, Thomas, Listonshiels, Balerno	1854
	Aitken, William, Chapel Colliery, Wishaw	1855
	Aiton, Rev. John, D.D., Minister of Dolphinton	1828
	Alexander, Alexander Humphreys	1825
	Alexander, Charles, Inversanda, Ardgour	1856
	Alexander, Lieut.-Colonel Claude, of Ballochmyle,	1862
	Alexander, Ebenezer, Taylortown, Stirling	1857
	Alexander, James, Seed-Merchant, Edinburgh	1857

		Admitted
	Alexander, James, of Balmule, Dunfermline	1842
	Alexander, John, Banff	1855
70	Alexander, Thomas, Corn Factor, Perth	1861
	Alexander, Wm., Bent of Haulkerton, Laurencekirk	1858
	Alison, Alexander, Glasgow	1844
	Alison, Thomas, of Calder Mill, Carstairs	1854
	Allan, Alexander, Advocate, Edinburgh	1833
	Allan, Alexander, Drummond, Evanton	1853
	Allan, Alexander, West Park, Auchterarder	1861
	Allan, Lieut.-Colonel, Edinburgh	1847
	Allan, James, Clifton Mains, Kirkliston	1851
	Allan, James, Clauchan, Arran	1855
80	Allan, James, West Mains, Stonehouse	1852
	Allan, James R., Inveramsay, Pitcaple	1858
	Allan, John, Billie Mains, Ayton	1854
	Allan, John, Crieffvechter, Crieff	1861
	Allan, Robert A., Greenburn, Ayton	1863
	Allan, Thomas, Fogorig, Dunse	1853
	Allan, Thomas, Westerwood, Cumbernauld	1857
	Allan, Thomas William Murray, of Havering, Essex	1852
	Allan, William, Edinburgh	1830
	Allen, James, Merchant, Glasgow	1815
90	Allman, George James, M.D., Professor of Natural History, University of Edinburgh	1858
	Alston, James W., of Stockbriggs, Lesmahagow	1844
	Alston, John Patrick, of Muirburn, Strathaven	1850
	Amos, James, Deanfoot, Minto	1863
	Amos, Thomas, Earlside, Hawick	1863
	Anderson, Alexander, Advocate, Aberdeen	1838
	Anderson, A. D., M.D., Glasgow	1844
	Anderson, David, of Moredun, Edinburgh	1825
	Anderson, David, of St Germains, Prestonpans	1829
	Anderson, David, Westhaven, Dundee	1843
100	Anderson, David, North Mains of Ethie, Arbroath	1858
	Anderson, George, Solicitor, Inverness	1839
	Anderson, George, Glasgow	1844
	Anderson, George B., Meikle Pinkerton, Dunbar	1859
	Anderson, George, of Woodhouse, Kirtlebridge	1862
	Anderson, George, Broomhill, Selkirk	1863
	Anderson, Henry, of Chapel, Kirkcaldy	1857
	Anderson, Henry, Burnside, Stanley	1861
	Anderson, James, Edinburgh	1839
	Anderson, James A., of Carlung, West Kilbride	1838
110	Anderson, James, Laggan, Ballantrae	1838

		Admitted
	Anderson, John, Lewinshope, Selkirk	1852
	Anderson, John, Merchant, London	1838
	Anderson, John, Merchant, Glasgow	1838
	Anderson, John, Craigton, Banchory	1857
	Anderson, John, Pratis, Largo	1857
	Anderson, John, Smithston, Kilsyth	1859
	Anderson, John, Braes of Foss, Pitlochry	1860
	Anderson, Lawrence, Chapel, Moffat	1851
	Anderson, Robert, of Lochdhu, Nairn	1856
120	Anderson, Robert H., Burleigh, Kinross	1861
	Anderson, Robert Hood, Glasgow	1850
	Anderson, Robert Wm., Clerk of Supply, Forfar	1858
	Anderson, Stephen, of Carfin, Motherwell	1849
	Anderson, Thomas, of Glendrisaig, Sheriff-Substitute, Kilmarnock	1832
	Anderson, Thomas, M.D., Professor of Chemistry, University of Glasgow, Chemist to the Society	1849
	Anderson, Thomas Scott, W.S., Edinburgh	1854
	Anderson, William, Town-Clerk, Leith	1842
	Anderson, William, Hattonburn, Banchory	1857
	Anderson, William, New Mill, Banchory	1857
130	Anderson, William James, Edinburgh	1840
	Andrew, Hugh, Keprigan, Campbeltown	1857
	Anstruther, James, Edinburgh	1827
	Anstruther, Robert, younger of Balcaskie, Lieut.-Colonel Grenadier Guards	1862
	Anton, James, Coltfield, Forres	1858
	Arbuthnot, George Clerk, of Mavisbank, Loanhead	1844
	Arbuthnot, Thomas, of Meethill, Peterhead	1829
	Arbuthnott, James Carnegy, of Balnamoon, Brechin	1813
	Archbald, Thomas, Carrington Mains, Lasswade	1855
	Archer, Andrew, Abbey Hill, Coupar-Angus	1846
140	Archibald, James, Brodick, Arran	1861
	Archibald, John, Duddingstone, South Queensferry	1849
	Arklay, John, Powmill, Brechin	1853
	Arklay, Robert, of Ethiebeaton, Dundee	1861
	Arkley, Patrick, of Duninald, Advocate, Edinburgh	1854
	Arkley, Robert H., Mains of Duninald, Montrose	1850
	Armour, Alex. B., Meiklehill, Kirkintilloch	1854
	Armstrong, Charles, of Cherry Valley, Antrim	1836
	Armstrong, James, Effgill, Langholm	1860
	Arnot, David, Adamston, Auchterhouse	1862
150	Arnott, G. A. Walker, of Arlary, LL.D., Professor of Botany, University of Glasgow	1837

		Admitted
	Arnott, James, of Leithfield, W.S., Edinburgh	1835
	Arras, Walter, Ormiston, Kelso	1862
	Arthur, John	1857
	Arundell, W. F. Hunter, of Barjarg, Dumfries	1858
	Askew, Henry William	1845
	Austin, R. Speir	1851
	Aytoun, James, Advocate, Edinburgh	1849
	Aytoun, Roger S., of Inchdairnie, M.P.. Kirkcaldy	1844
	Aytoun, William Edmonstoune, D.C L., Sheriff of Orkney and Shetland, Edinburgh	1838
160	*BUCCLEUCH and QUEENSBERRY, His Grace Walter, Duke of, K.G.	1828
	BUCCLEUCH and QUEENSBERRY, Her Grace Charlotte, Duchess of	1835
	BOWMONT, The Most Noble James, Marquis of	1863
	†BLANTYRE, the Right Hon. Charles, Lord	1843
	†BELHAVEN and STENTON, The Right Hon. Lord	1816
	BINNING, The Right Hon. George, Lord	1857
	BOYLE, The Hon. George Frederick	1854
	BRUCE, The Hon. Thomas Charles	1852
	BURNETT, Sir James Horn, of Leys, Bart.	1834
	BANNERMAN, Sir Alex., of Crimonmogate, Bart.	1858
170	BAIRD, Sir James Gardiner, of Saughtonhall, Bart.	1843
	BLAIR, Sir Edward Hunter, of Blairquhan, Bart.	1850
	BAIRD, Sir David, of Newbyth, Bart.	1860
	BAILLIE, Sir William, of Polkemmet, Bart.	1847
	BOSWALL, Sir George Houstoun, of Blackadder, Bart.	1848
	BAXTER, Sir David, of Kilmaron, Bart.	1843
	BANNERMAN, Sir Alex., Governor of Newfoundland	1835
	Baikie, James, of Tankerness, Kirkwall	1818
	Baillie, Evan, of Dochfour, Inverness	1824
	Baillie, Henry James, younger of Redcastle, M.P.	1839
180	Baillie, Colonel Hugh Duncan, of Redcastle, Beauly	1839
	Baillie, James Evan, of Glenelg, Inverness	1839
	Baillie, James, William, of Culterallers, W.S., Edin.	1851
	Bain, John, of Morriston, Glasgow	1833
	Baird, Charles J.	1844
	Baird, George, of Strichen, Aberdeen	1838
	Baird, Henry, Abbots Grange, Grangemouth	1853
	Baird, James, of Knoydart, Cambusdoon, Ayr	1838
	Baird, John, of Ury, Glasgow	1838
	Baird, William, of Elie, Fife	1845

		Admitted
190	Baird, William, Grain-Merchant, Glasgow	1844
	Balfour, Arthur J., of Whittingham, Prestonkirk	1863
	Balfour, Charles, of Balgonie, Markinch	1846
	Balfour, David, of Balfour and Trenabie, Kirkwall	1843
	Balfour, Major Fras. W., of Fernie Castle, Letham	1857
	Balfour, James, Milton, Leuchars	1842
	Balfour, John, of Balbirnie, Markinch	1839
	Balfour, John Hutton, M.D., Professor of Botany, University of Edinburgh	1839
	Balfour, Major-General, of Arbigland, Dumfries	1849
	Balfour, William, of Birstane, Kirkwall	1844
200	Balfour, William, Merchant, Glasgow	1820
	Ballantine, James, of Castlehill, Ayr	1822
	Ballantyne, James, of Holylee, Innerleithen	1832
	Ballantyne, John, junior, Seedsman, Dalkeith	1860
	Ballantyne, Thomas, Whitehope, Selkirk	1852
	Ballingal, Neil, Springfield, Kinross	1851
	Ballingal, Robert, Eallibus, Islay	1853
	Ballingall, David, Factor, Blairdrummond	1857
	Ballingall, George, Ayton, Cupar-Fife	1860
	Ballingall, John, Dunbog, Newburgh	1861
210	Ballingall, William, Sweetbank, Markinch	1859
	Balmer, Thomas, Gordon Castle, Fochabers	1863
	Bankes, Meyrick, of Letterewe, Dingwall	1862
	Barbour, George F., of Bonskeid, Pitlochry	1859
	Barbour, Thomas, of Dalshangan, Carsphairn	1846
	Barclay, Arthur Hay, of Paris, Perthshire	1848
	Barclay, Charles A., Aberdour House, Fraserburgh	1858
	Barclay, George, Davochbeg, Golspie	1855
	Barclay, George, Yonderton, King Edward	1858
	Barclay, George Robertson, of Keavil, Dunfermline	1834
220	Barclay, James Wm., Auchlossan, Lumphanan	1862
	Barclay, Colonel P., Edinburgh	1847
	Barclay, Robert, Drums, Falkland	1859
	Barclay, Thomas, Montrose	1855
	Bardner, James, Chesterstone, Largo	1859
	Barker, Bradshaw, Wyseby Hill, Ecclefechan	1855
	Barker, Thomas, of Sydney, Australia	1839
	Barlas, Robert, Edinburgh	1844
	Barns, Patrick Graham, of Limekilns, East Kilbride	1836
	Barr, James, Silvertonhill, Hamilton	1847
230	Barr, James, Law Colliery, Carluke	1862
	Barr, John, Barangry, Bishopton	1851
	Barron, George, Pittenkerie, Banchory	1857

		Admitted
	Barstow, Charles M., Accountant, Edinburgh	1846
	Bartholomew, James, Duntarvie, Winchburgh	1855
	Bartholomew, John, of Broomhill, Merchant, Glasgow	1838
	Bartholomew, Robert, Merchant, Glasgow	1838
	Bathgate, James, Currielea, Ford	1861
	Baxter, Edmund, W.S., Edinburgh	1854
	Baxter, George, Craigforthie, Keith Hall	1858
240	Bayley, Isaac, of Manuel, Edinburgh	1828
	Bayne, William, Cattle-Dealer, Cupar-Fife	1862
	Beattie, James, Newbie House, Annan	1854
	Beattie, Peter, Dunnydeer, Insch	1858
	Begbie, Alexander, Leamington	1832
	Begbie, James, Implement Maker, Haddington	1859
	Begbie, Thomas, Queenston-bank, Drem	1852
	Begg, David, of Canons Park, Edgeware, London	1862
	Begg, John, Distiller, Balmoral, Crathie	1858
	Begg, Robert, Greenock	1861
250	Beith, John, Grain-Dealer, Rothesay	1857
	Beith, John, Banker, Campbeltown	1836
	Belany, Charles, Hillend, Ayton	1854
	Belford, Andrew, of Glenfintaig, Inverness	1839
	Belfrage, George, North Gyle, Corstorphine	1849
	Belfrage, James, Samuelston East Mains, Haddington	1849
	Bell, Charles, Edinburgh	1856
	Bell, David, Todhall, Cupar-Fife	1856
	Bell, George, Inchmichael, Errol	1852
	Bell, George Graham, of Crurie, Advocate	1835
260	Bell, Henry J., Rockdale Cottage, Perth	1860
	Bell, John, Glenduckie, Newburgh, Fife	1859
	Bell, John, of Enterkine, Tarbolton	1839
	Bell, John Beatson, of Glenfarg, W.S., Edinburgh	1841
	Bell, John D., Newton of Balgray, Balbeggie, Perth	1861
	Bell, Robert, of Lunna, Sheriff-Substitute of Shetland	1846
	Bell, Thomas, Moile of Cantyre, Campbeltown	1854
	Bell, Thomas, Ballinshoe, Kirriemuir	1856
	Bell, William, Edinburgh	1855
	Belshes, A. H. Murray, of Invermay, Bridge of Earn	1824
270	Bennet, Alexander, Deskie, Ballindalloch	1857
	Bennet, James, Marypark, Ballindalloch	1857
	Benton, Joseph, Cattie, Whitehouse	1858
	Benton, William, Harthill, Whitehouse	1858
	Berry, John, of Tayfield, Tayport	1848
	Bertram, George, Engineer, West Sciennes, Edinburgh	1860
	Bertram, John S., Cranshaws, Dunse	1854

		Admitted
	Bertram, Thomas Hardy, Engineer, London	1845
	Bertram, William, of Nisbet, Biggar	1852
	Bertram, William, Limielands, Smeaton, Dalkeith	1862
280	Berwick, Alexander, Merchant, Glasgow	1852
	Berwick, David, Denbrae, St Andrews	1861
	Bethune, Admiral, of Balfour, C.B., Markinch	1857
	Bethune, Alexander, of Blebo, Cupar-Fife	1848
	Bett, David J., Flatfield, Coupar-Angus	1861
	Bett, James, Easdale, Oban	1857
	Beveridge, David, Buckthorns, Largo	1859
	Beveridge, Erskine, of Brucefield, Dunfermline	1855
	Beveridge, George, Orrick, Burntisland	1862
	Beveridge, James, Easter Balado, Kinross	1851
290	Beveridge, Robert E., Urquhart, Dunfermline	1853
	Beveridge, William, Orrick, Burntisland	1862
	Bigg, Thomas, London	1842
	Biggar, James, of Maryholm, Dumfries	1860
	Biggar, Thomas, of Chapelton, Haugh of Urr	1858
	Binnie, John, Eschills, Peebles	1859
	Binnie, Robert, Seton Mains, Tranent	1847
	Binning, John, Brae, Dingwall	1849
	Bird, James B., Fishwick, Paxton	1858
	Biscoe, Thomas Porter Bonell, of Newton, Inverness	1846
300	Bisset, The Ven. Archdeacon, of Lessendrum, Huntly	1862
	Black, Adam, M.P., Edinburgh	1846
	Black, Alexander, Civil-Engineer, Falkirk	1856
	Black, David, Barrelwell, Brechin	1850
	Black, James, London	1851
	Black, James, Merchant, Glasgow	1838
	Black, James, Greenlaw Dean, Greenlaw, Dunse	1854
	Black, James, Knock, Keith	1852
	Black, James Spens, Merchant, Glasgow	1839
	Black, James W., Wandelmill, Abington	1857
310	Black, John, Arlary, Kinross	1851
	Black, John, Fern Bank, Bishopbriggs	1855
	Black, John, Seton Hill, Prestonpans	1859
	Black, John, Westfield, Coldstream	1859
	Black, Robert, Glasgow	1844
	Blackburn, James J., Mill of Forest, Stonehaven	1854
	Blackburn, Peter, of Killearn, M.P.	1842
	Blackburn, Robert B., Advocate, Edinburgh	1846
	Blackie, Archibald Gibson, Peebles	1858
	Blackley, John, Glasgow	1855
320	Blacklock, Adam, Minnygap, Moffat	1857

		Admitted
	Blackwood, John, Publisher, Edinburgh	1842
	Blackwood, William, Publisher, Edinburgh	1862
	Blair, Col. Stopford, of Penninghame, Newton-Stewart	1849
	Blair, James, of Glenfoot, Tillicoultry	1860
	Blair, Thomas, Bankhead, Ceres	1857
	Blair, William, of Avontoun, Linlithgow	1817
	Blair, Captain William Fordyce, of Blair, R.N., Dalry	1844
	Blanchard, George, Merchant, Edinburgh	1847
	Blandow, Michael Von, St Petersburg, Honorary Associate	1836
330	Blane, Colonel Robert, C.B.	1836
	Blues, Andrew A., Dalruscan, Tinwald, Dumfries	1861
	Blyth, David, Leckiebank, Auchtermuchty	1861
	Bogie, Alexander, of Newmill, Cupar-Fife	1860
	Bogie, John, Balcanquhall, Auchtermuchty	1851
	Bogie, William, Balneil, Colinsburgh	1861
	Bolam, John, Glororum, Belford	1854
	Bolam, John, junior, Chathill, Northumberland	1863
	Bolton, Joseph C., of Carbrook, Falkirk	1858
	Bonar, Andrew, Australia	1824
340	Bonar, James, Merchant, London	1835
	Bonar, William, of East Warriston, Edinburgh	1828
	Bonar, William Graham, of Greigston, Ceres	1835
	Booth, James Godfrey, Seed-Merchant, Hamburg	1842
	Booth, Richard, Warlaby, Northallerton	1854
	Borland, Robert, Auchencairn, Closeburn	1862
	Borthwick, Alex. Hay, Mosspeeble, Langholm	1859
	Borthwick, Gilbert, Cowbog, Kelso	1854
	Borthwick, John, V.S., Kirkliston	1858
	Borthwick, John, of Crookston, Heriot	1846
350	Borthwick, John James M., Georgefield, Langholm	1859
	Borthwick, Thomas Chalmers, Hopsrig, Langholm,	1838
	Borthwick, Thomas, South Queensferry	1862
	Borthwick, Wm. Henry, Crookston, Heriot	1857
	Bosomworth, John, Abernethy	1861
	Boswell, John Douglas, of Garallan, Ayr	1836
	Bowhill, James, Banker, Ayton	1863
	Bowie, Alexander, Mains of Kelly, Arbroath	1854
	Bowie, Peter, Carlogie, Carnoustie	1858
	Bowman, James, Cadder Mill, Bishopbriggs	1857
360	Bowman, James, Crail	1859
	Bowman, Thomas, Halbill, Baillieston	1855
	Boyd, James B., Doddington, Wooler	1853
	Boyd, John, Berwick	1804

		Admitted
	Boyd, John B., of Cherrytrees, Kelso	1861
	Boyd, William B., Hetton Hall, Belford	1863
	Boyle, Patrick, of Shewalton, Irvine	1835
	Boyle, Robert, Tile Manufacturer, Ayr,	1850
	Brand, Charles, Mains of Fordoun, Fordoun	1858
	Brand, William, Secretary, Union Bank of Scotland	1846
370	Brander, James, Avoch, Fortrose	1830
	Brandreth, Humphrey, of Houghton House, Dunstaple	1840
	Brash, James, Hallyards, Kirkliston	1855
	Brebner, James, Advocate, Aberdeen	1834
	Broad, William, Clifton-hill, Kelso	1853
	Brock, John, Overton, Kirkliston	1858
	Brockley, Robert M., Gourlaw, Lasswade	1857
	Brodie, James, Banker, Kirriemuir	1859
	Brodie, James, Leaston, Blackshiels	1848
	Brodie, John Clerk, W.S., Edinburgh	1840
380	Brodie, Patrick, Clarilaw, Selkirk	1834
	Brodie, R. J., of Blairhoyle, Stirling	1860
	Brodie, William, of Brodie, Forres	1821
	Broomfield, Thomas, Lauder	1855
	Brotchie, Robert, of Swanny, Leith	1855
	Broughton, Robert Henry, of Rowchester, Greenlaw	1854
	Brown, Adam, Helmburn, Selkirk	1863
	Brown, Alex. J. Dennistoun, of Balloch, Dumbarton	1844
	Brown, Andrew, M.D.	1852
	Brown, Archibald, Craig, Udny	1858
390	Brown, Charles, Factor, Gartmore, Stirling	1857
	Brown, Major David, of Park, Corstorphine.	1834
	Brown, Daniel, Naturalist, Perth	1861
	Brown, David Wardlaw, of Longformacus, Dunse	1841
	Brown, George, Watten Mains, Wick	1839
	Brown, George, Balgarvie, Cupar-Fife	1851
	Brown, George, Westerton, Fochabers	1858
	Brown, Hugh H., of Newhall, Penicuik	1843
	Brown, James, Accountant, Edinburgh	1816
	Brown, James, Hardgrave, Annan	1860
400	Brown, James, of Lochton, Dundee	1843
	Brown, James, of Orchard, Carluke	1849
	Brown, James, Clephanton Cottage, Anstruther	1861
	Brown, James, Liberton Mains, Carnwath	1855
	Brown, James Bertram, Smeaton, Dalkeith	1848
	Brown, James T., of Auchlochlan, Lesmahagow	1837
	Brown, John, Outterston, Fushie Bridge	1856
	Brown, John, Boghall, Biggar	1857
	Brown, John, Inglistone, Irongray,	1860

		Admitted
	Brown, John George, Edinburgh	1852
410	Brown, J. Carruthers, Bridekirk Mains, Annan	1860
	Brown, Jonathan, Brewery House, Aspatria	1857
	Brown, Matthew, Greenock	1832
	Brown, Dr, Melrose	1855
	Brown, Oliphant, Glenlee, New Galloway	1861
	Brown, Peter, Linkwood, Elgin	1821
	Brown, Peter, Rossland, Paisley	1856
	Brown, Robert, Drumbowie, New Monkland, Airdrie	1856
	Brown, Robert, Sandyflat, Maryhill	1857
	Brown, Thomas, Burton, Belford	1854
420	Brown, Thomas, Secy. Agricul. Soc., Campbeltown	1863
	Brown, Thomas, Slipperfield, West Linton	1849
	Brown, Walter, of Colton, Dunfermline	1854
	Brown, William, Merchant, Glasgow	1828
	Brown, William, Banker, Maybole	1835
	Brown, William, Merchant, Dundee	1843
	Brown, William, of Greenock Mains, Muirkirk	1850
	Brown, William, Linkwood, Elgin	1854
	Brown, William, Factor, Invercauld, Braemar	1861
	Brown, William Henry, of Ashley, Ratho	1833
430	Bruce, A., Wealtherton of Keig, Whitehouse	1858
	Bruce, C. L. Cumming, of Roseisle & Kinnaird, M.P.	1817
	Bruce, Charles, Broadland, Huntly	1862
	Bruce, John, of Sumburgh, Zetland	1829
	Bruce, John, W.S., Edinburgh	1842
	Bruce, Robert, of Kennet, Clackmannan	1819
	Bruce, Thomas, of Arnot, Kinross	1855
	Bruce, William, of Symbester, Zetland	1838
	Bryce, David, Architect, Edinburgh	1846
	Bryce, Rev. James, D.D., Edinburgh	1813
440	Brydon, Adam, Netherbarns, Galashiels	1862
	Brydon, James, Moodlaw, Langholm	1850
	Brydon, John, Netherbarns, Galashiels	1857
	Brydon, Thomas, Kinnelhead, Moffat	1859
	Brydon, Walter, Burncastle, Lauder	1863
	Bryson, Robert, Merchant, Glasgow	1850
	Bryson, W. G., Cullen	1852
	Buchan, Colonel Fordyce, of Kelloe, Edrom	1857
	Buchan, Matthew, Beechwood Mains, Corstorphine	1861
	Buchan, William, Dolphinton, South Queensferry	1839
450	Buchanan, Alexander, Whitehouse, Stirling	1854
	Buchanan, Alexander, Garscadden, East Kilpatrick	1857
	Buchanan, Andrew, of Auchintorlie, Dunglass	1838
	Buchanan, Andrew, of Mount Vernon, Shettleston	1827

		Admitted
	Buchanan, David Carrick, of Dumpellier, Coatbridge	1849
	Buchanan, Duncan, Auchnabreck, Cairndow	1853
	Buchanan, Isaac, Canada	1851
	Buchanan, James, Glasgow	1838
	Buchanan, John, London	1838
	Buchanan, John, of Glenlora, Lochwinnoch	1844
460	Buchanan, John, of Carbeth, Killearn	1838
	Buchanan, John, Coldrach, Drymen	1857
	Buchanan, Niel Griffiths, of Knockshinnoch	1850
	Buchanan, Robert, Glasgow	1811
	Buchanan, Thomas Gray, of Wellshot, Glasgow	1849
	Buchanan, Walter, of Shandon, M.P.	1842
	Buchanan, William, Merchant, Glasgow	1828
	Buist, James, Kirkton Barns, Newport	1842
	Buist, Mathew, Tynninghame, Prestonkirk	1848
	Buist, Robert, Blairlogie, Stirling	1863
470	Burn, Henry J., Cuttlehill, Crossgates	1843
	Burn, James, W.S., Edinburgh	1825
	Burn, John, Ednam, Kelso	1863
	Burn, Robert Scott, Castle Farm, Stockport	1860
	Burn, William, Architect, London	1824
	Burns, John William, yr. of Kilmahew, Dumbarton	1861
	Burnet, James, Aberlady, Drem	1854
	Burnett, Alexander, Culduthel, Inverness	1839
	Burnett, George, Advocate, Edinburgh	1848
	Burnett, Gregory, Dee Cottage, Flint	1840
480	Burnett, Newell, Advocate, Aberdeen	1834
	Burnett, Robt., yr. of Leys, Crathes, Aberdeen	1858
	Burroughs, Wm. Frederick Traill, of Rolfsea, Orkney	1854
	Burnley, W. F., Edinburgh	1838
	Bursby, George, Kirkhouse, Traquair	1859
	Burt, Dr John, Edinburgh	1831
	Burton, John, Rosewell Mains, Lasswade	1857
	Burton, William Tait, of Toxside, Gorebridge	1848
	Buttar, David, Corston, Coupar-Angus	1861
	Butter, Archibald, of Faskally, Pitlochry	1825
490	Buttery, A. W., Glasgow	1844
	Byres, Pat. Moir, of Tonley, Whitehouse, Aberdeen	1858
	CRAWFORD and BALCARRES, The Right Hon. James, Earl of	1847
	CAITHNESS, The Right Hon. James, Earl of	1845
	CAWDOR, The Right Hon. John, Earl	1839

		Admitted
	CAMPERDOWN, The Right Hon. Adam, Earl of	1843
	COLVILLE (of Culross), The Right Hon. Charles, Lord	1851
	CATHCART, Colonel The Hon. Frederick Macadam, of Craigengillan	1830
	CARNEGIE, The Hon. Charles, M.P.	1856
	CLERK, The Right Hon. Sir George, of Penicuik, Bart., Honorary Secretary of the Society	1812
500	COWAN, The Hon. Lord	1848
	CURRIEHILL, The Hon. Lord	1822
	COLQUHOUN, Sir James, of Luss, Bart.	1829
	CAMPBELL, Sir James, of Aberuchil, Bart.	1838
	CARMICHAEL, Sir William H. Gibson, of Castle-Craig and Skirling, Bart.	1856
	CAMPBELL, Sir Hugh Hume, of Marchmont, Bart.	1834
	CATHCART, Sir John Andrew, of Carleton, Bart.	1834
	COLEBROOKE, Sir Thomas Edward, of Crawford, Bart., M.P.	1838
	CUMMING, Sir Alexander Penrose Gordon, of Altyre and Gordonston, Bart.	1846
	CAMPBELL, Sir Archibald Islay, of Succoth, Bart.	1844
510	CRAIG, Sir William Gibson, of Riccarton, Bart., Treasurer of the Society	1824
	CAMPBELL, Sir Alexander, of Barcaldine, Bart.	1845
	CAMPBELL, Sir Angus, of Dunstaffnage, Bart.	1851
	CAMPBELL, Sir James, of Stracathro, Glasgow	1838
	COCHRANE, Admiral Sir Thomas, G.C.B.	1817
	Cadell, Alex. Tod, Indian Army	1844
	Cadell, Henry, of Grange, Bo'ness	1856
	Cadell, Hew Francis, of Cockenzie, Prestonpans	1844
	Cadell, John, of Tranent, Advocate, Edinburgh	1854
	Caird, James, of Cassencarie, M.P., Creetown	1853
520	Cairns, George, Edinburgh	1857
	Cairns, William, Ballinloan, Dunkeld	1861
	Calder, Francis, Yetholm Mains, Kelso	1853
	Calder, James, Colgrain, Dumbarton	1857
	Calder, Marcus, Shapinshay, Kirkwall	1846
	Calder, Robert, Kelloe Mains, Edrom	1857
	Calder, Robert, Whitehouse, Lumphanan	1858
	Calder, William, Cattle-Salesman, Edinburgh	1851
	Calder, James H., Swinton Hill, Coldstream	1863
	Caldow, James, Maxwelltown	1860
530	Caldwell, Frederick, of Missinish	1841
	Caldwell, William, Boydstone, Ardrossan	1862

		Admitted
	Callender, Henry, Accountant, Edinburgh	1843
	Cameron, Alexander, Invercomrie, Pitlochrie	1854
	Cameron, Alexander, Bogside, Cadder, Springburn	1857
	Cameron, Allan, Urray Cottage, Beauly	1857
	Cameron, Donald, of Lochiel, Fort-William	1859
	Cameron, Donald Colin, Tallisker, Broadford	1861
	Cameron, Hugh Innes, London	1835
	Cameron, Capt. James, Bilbohall, Elgin	1850
540	Cameron, James, Balnakyle, Munlochy	1857
	Cameron, John, of Glenesk, Loanhead	1846
	Cameron, Peter, Edinburgh	1850
	Cameron, William, Millhill, Auchterarder	1852
	Cameron, William, Lettirellin Cottage, Kenmore	1862
	Campbell, Alexander, of Auchindarroch, Lochgilphead	1837
	Campbell, Captain Alexander, of Brackley, Nairn	1806
	Campbell, Alexander, of Monzie	1833
	Campbell, Alexander, Edinburgh	1835
	Campbell, Alexander, Crosshill, Bishopbriggs	1857
550	Campbell, Alex. Henry, of Little Grove, Herts	1863
	Campbell, Archibald, of Glendaruel	1826
	Campbell, Archibald, Camserney Cottage, Aberfeldy	1832
	Campbell, Archibald, of Blythswood, Renfrew	1848
	Campbell, Lt.-Col. Archd., yr. of Blythswood,	1857
	Campbell, Archibald, yr. of Lerags, M.D.	1845
	Campbell, Archibald, Park, Aberdeen	1855
	Campbell, Arthur, of Catrine, W.S., Edinburgh	1816
	Campbell, Arthur, yr. of Catrine, W.S., Edinburgh	1854
	Campbell, Charles Vereker Hamilton, of Nether Place	1853
560	Campbell, Colin, of Colgrain	1847
	Campbell, Colin, of Caolis, Ballifetrich, Tyree	1858
	Campbell, Colin, of Ballinaby, Islay	1861
	Campbell, Colin G., of Stonefield, Tarbert	1838
	Campbell, Colin Yorke, of Barbreck, Captain R.N.	1858
	Campbell, David, Kirkforthar, Markinch	1854
	Campbell, Donald	1846
	Campbell, Donald, Reef Cottage, Tyree	1857
	Campbell, Dugald M'Neill, of Kintarbet, Tarbert	1847
	Campbell, Duncan T., Duiletter, Dalmally	1858
570	Campbell, Farquhar, of Aros, Tobermory	1839
	Campbell, George William, Mayfair, London	1863
	Campbell, George J., of Treesbanks, Kilmarnock	1835
	Campbell, Henry Fletcher, of Boquhan, Stirling	1823
	Campbell, Hugh, Surgeon, Glenralloch, Tarbert	1861
	Campbell, Humphrey Walter, Dumbarton	1838

		Admitted
	Campbell, Ivie, Dalgig, New Cumnock	1856
	Campbell, James, London	1838
	Campbell, James, younger of Tillichewan, Dumbarton	1847
	Campbell, James, Milford, Creggs, Roscommon	1850
580	Campbell, James Archibald, of Inverawe	1833
	Campbell, James A., younger of Stracathro	1849
	Campbell, James G., Killyleoch, Dunscore	1860
	Campbell, John, Boreland, Kenmore	1860
	Campbell, John, of Garrows, Amulree	1857
	Campbell, John, of Possil, Torosay, Oban	1848
	Campbell, John, of Southhall, Greenock	1821
	Campbell, John, of Strachur	1829
	Campbell, John, of Achalader, Blairgowrie	1846
	Campbell, Rev. John, Killin	1858
590	Campbell, John, Remnil, Campbeltown	1857
	Campbell, John, of Inverardoch, Doune	1857
	Campbell, John, of Ardfinaig, Ross of Mull, Aros	1857
	Campbell, John Archibald, W.S., Edinburgh	1813
	Campbell, John Deans, of Kurreath and Loeg	1835
	Campbell, John Graham, of Shirvan, Lochgilphead	1863
	Campbell, Kenneth, of Ardow, Tobermory	1843
	Campbell, Major-General, C.B.	1857
	Campbell, Mungo, Glasgow	1824
	Campbell, Neil Colquhoun, of Barnhill, Dumbarton	1863
600	Campbell, Ord Graham, Edinburgh	1838
	Campbell, Richard D., of Jura	1836
	Campbell, Robert, of Sonachan, Inverary	1802
	Campbell, Rose	1809
	Campbell, Silvester, Kinellar, Blackburn	1858
	Campbell, Thomas, Edinburgh	1837
	Campbell, Thomas, Croftness, Aberfeldy	1860
	Campbell, Thomas, of Annfield, Irvine	1856
	Campbell, T. W., of Walton Park, Dalbeattie	1856
	Campbell, Colonel Walter, N.B. Staff, Glasgow	1836
610	Campbell, William, of Tillichewan Castle, Dumbarton	1838
	Campbell, William, of Ormsary, Ardrishaig	1839
	Campbell, William, of Dunmore, Tarbert	1854
	Campbell, William, Town-Clerk, Wishaw	1858
	Campbell, W., Cladwell, Islay	1861
	Campbell, W. F., of Craigie, Ayr	1861
	Cant, James, Orr Bridge, Kirkcaldy	1863
	Cantlie, William, Keithmore, Mortlach	1852
	Carfrae, Thomas, Land-Surveyor, Edinburgh	1850
	Carlyle, Thomas Johnstone, of Waterbeck, Ecclefechan	1845

		Admitted
620	Carmichael, Michael Thomson, of Eastend, Lanark	1825
	Carnegie, David, of Stronvar, Lochearnhead	1847
	Carnegie, George R., Edrom-Newton, Ayton	1854
	Carnegie, James, of Edrom-Newton, W.S., Edinburgh	1852
	Carnegie, John, of Redhall, Fordoun	1836
	Carnegie, William, Dunlappie, Brechin	1858
	Carnegie, William, junior, Coul, Tannadyce	1858
	Carnegy, John	1850
	Carphin, George, Banker, Dunkeld	1861
	Carre, Walter Riddell, of Cavers Carre, Selkirk	1863
630	Carruthers, Alexander, Warmanbie, Annan	1826
	Carruthers, James, Craig, Castle-Douglas	1860
	Carruthers, John, Kirkhill, Moffat	1854
	Carruthers, William Francis, of Dormont, Lockerbie	1848
	Carstairs, Drysdale, Merchant, Liverpool	1838
	Carstairs, John, Smeaton, Kirkaldy	1859
	Carter, Thomas, Allanton, Chirnside	1863
	Carver, John, Kinloch, Meigle	1861
	Cassels, Alexander, W.S., Edinburgh	1848
	Cathcart, Elias, of Auchindrane, Ayr	1819
640	Cathcart, R., of Pitcairlie, Auchtermuchty	1857
	Cay, John, Advocate, Sheriff of Linlithgowshire	1841
	Chalmer, Major, Larbert House, Stirling	1852
	Chalmers, Charles, of Monkshill, Aberdeen	1824
	Chalmers, John Inglis, of Aldbar, Brechin	1844
	Chalmers, Thomas, of Longcroft House, Linlithgow	1860
	Chambers, Robert, London	1841
	Chancellor, John G., of Shieldhill, Biggar	1849
	Chandler, Henry, Salford	1857
	Charge, Thomas, of Barton, Richmond, York	1833
650	Cheape, Lieut.-Col. Charles, of Killundine, Morven	1860
	Cheyne, Henry, of Tangwick, W.S., Edinburgh	1838
	Cheyne, Mrs, of Lismore	1857
	Chiene, George Tod, Edinburgh	1838
	Chirnside, George, Hoprig, Cockburnspath	1860
	Chisholm, John, Charleston, Inverness	1854
	Chisholm, Lachlan, late of Lochans	1831
	Chisholm, William, Barnyards, Inverness	1856
	Chisholme, John Scott, of Stirches, Hawick	1839
	Chivas, Alexander, Banker, Aberdeen	1840
660	Chrisp, Thomas, Hawkhill, Alnwick	1853
	Christie, Andrew, Adinston, Tranent	1850
	Christie, Charles J., Westbank, Tranent	1850
	Christie, Charles J., Cairndinnes, Haddington	1862

		Admitted
	Christie, Charles Maitland, of Durie, Leven	1841
	Christie, Hugh, Glengolandie, Aberfeldy	1854
	Christie, Captain James, Hillend, Clackmannan	1835
	Christie, Jas. H. R. Stark, of Teasses, Largo	1863
	Christie, John, Halleaths, Lockerbie	1846
	Christie, John, Land-Valuator, Perth	1861
670	Christie, Peter, Mains of Scotscraig, Tayport	1861
	Christie, Robert, Accountant, Edinburgh	1824
	Christie, Thomas Craig, of Bedlay, Moodiesburn	1857
	Christison, R., M.D., Professor of Materia Medica, University of Edinburgh	1848
	Chrystal, John, Dasherhead, Gargunnock	1854
	Chrystie, Captain Alexander	1834
	Chrystie, Captain Thomas, R.N., Edinburgh	1841
	Church, D. M., Ferniebank, Liberton	1855
	Church, James, Tower of Sark, Canonbie	1838
	Church, Miss Margaret, Park House, Canonbie	1860
680	Clapperton, James, Caddenlee, Galashiels	1859
	Clapperton, John, Newlands, Gifford	1855
	Clapperton, Thomas, Edinburgh	1837
	Clark, Archibald, Inverchapple, Kilmun	1853
	Clark, Francis William, of Ulva, Aros	1838
	Clark, James, Wormiston, Crail	1842
	Clark, James, Ardtaraig, Dunoon	1853
	Clark, James, of Crossbasket, Glasgow	1857
	Clark, John, Plean, Stirling	1851
	Clark, John, Flender, Busby	1857
690	Clark, John, Hillhead, Kingsbarns, Fife	1861
	Clark, John Gilchrist, of Speddoch, Dumfries	1858
	Clark, Maxwell, of Little Culmain, Urr, Dumfries	1862
	Clark, Samuel, Manswrae, Kilbarchan	1852
	Clark, William, Glentrain, Campbeltown	1857
	Clarke, Alexander, Eriboll, Lairg	1847
	Clarke, George, Stronchrubie, Assynt	1855
	Clason, Rev. Patrick, D.D., Edinburgh	1838
	Clay, John, Winfield, Dunse	1854
	Clay, John, Kerchesters, Kelso	1854
700	Clay, Patrick, Berwick-on-Tweed	1854
	Clayhills, Alexander, of Invergowrie, Dundee	1838
	Clerk, Duncan, writer, Oban	1860
	Clerk, James, younger of Penicuik	1847
	Climie, William, Paisley	1857
	Clouston, Peter, Lord-Provost of Glasgow	1850
	Coats, Peter, of Woodside, Paisley	1852

		Admitted
	Coats, Thomas, of Ferguslie, Paisley	1852
	Cobb, William, Mains of Fintray, Dundee	1843
	Cochrane, Alexander, of Ashkirk, Hawick	1861
710	Cochrane, Alexander Baillie, of Lamington, M.P.	1842
	Cochrane, Henry, Broxburn Park, Broxburn	1854
	Cochrane, James, of Harburn, West Calder	1849
	Cochrane, James, Little Haddo, Foveran	1858
	Cochrane, William, New Milton, Roslin	1848
	Cockburn, George, Kilchiaron, Islay	1861
	Cockburn, Thomas, of Menslaws, Jedburgh	1851
	Cogan, Robert, Merchant, Glasgow	1830
	Coldwells, John, Stobsmills, Fushiebridge	1845
	Cole, Captain William W., London	1848
720	Colledge, William, Pollockshaws	1850
	Collie, James, Haughhead, Laurencekirk	1840
	Collie, John, Ardgay, Elgin	1853
	Collier, John, Pantlathie, Carnoustie	1843
	Collier, Thomas, Hatton, Muirdrum	1835
	Collyer, William D., Harperfield, Lanark	1857
	Colquhoun, Arch. Campbell, yr. of Killermont, Maryhill	1854
	Colquhoun, John, Corkerhill, Pollockshaws	1850
	Colquhoun, John Campbell, of Killermont, Maryhill	1824
	Colville, D. W., Castle of Rednock, Port of Monteith	1862
730	Colville, Robert, East Newton, Chance Inn	1858
	Colvin, Andrew, Merchant, Wick	1861
	Colvin, William, of Craigielands, Moffat	1860
	Condie, George, Writer, Perth	1852
	Condie, James, Blackfriar's House, Perth	1839
	Connal, William, Glasgow	1850
	Connell, Arthur, Edinburgh	1855
	Connell, James, of Conheath, Irvine House, Langholm	1843
	Conning, John, Solicitor, Perth	1852
	Constable, George, of Soylziary, Blairgowrie	1852
740	Constable, James Nicoll, of Balmyle, Blairgowrie	1843
	Constable, James C., of Callie, Blairgowrie	1854
	Constable, James, Seaside, Errol	1860
	Cook, Alexander Shank, Advocate, Sheriff of Ross-shire	1859
	Cook, Charles, Aboyne Arms Inn, Aboyne	1858
	Cook, John, W.S., Edinburgh	1841
	Cooper, Henry R., of Ballindalloch, Balfron	1845
	Cooper, James, Hillbrae, Bourtie, Keith Hall	1858
	Cooper, William, of Failford, Tarbolton	1845
	Copland, Robert, Mill of Ardlethen, Ellon	1855
750	Copland, Walter, Thirlestane, Selkirk	1863

		Admitted
	Cordiner, William F., Fraserford, Dunscore	1840
	Corrie, Adam, South Park, Borgue, Kirkcudbright	1860
	Cossar, Robert, Chesterhall, Dunbar	1859
	Coubrough, Archibald, Carwood, Biggar	1857
	Coubrough, James, Blairtummoch, Campsie	1852
	Coupar, John, Balrownie, Brechin	1859
	Coutts, William, Sandlaw, Banff	1858
	Coventry, Andrew, of Pittilloch, Edinburgh	1844
	Coventry, George Andrew, yr. of Shanwell	1852
760	Cowan, Andrew, Spittalhill, Fintry	1857
	Cowan, Charles, of Logan, Penicuik	1836
	Cowan, Charles W., yr. of Logan, Penicuik	1860
	Cowan, David, Edinburgh	1844
	Cowan, James, of Dildawn, LL.D., Castle-Douglas	1852
	Cowan, John, of Beeslack, Milton Bridge	1858
	Cowan, Peter, Lurg, Fintry	1857
	Cowan, Richard	1854
	Cowan, Robert, W.S., Edinburgh	1861
	Cowan, Robert, Arniston, Gorebridge	1862
770	Cowie, Alexander, Crombly Bank, Ellon	1853
	Cowie, David, Dysart, Montrose	1851
	Cowie, James, Montrose	1852
	Cowper, James, Achorachan, Ballindalloch	1860
	Craib, John, Strathmore, Tarland	1858
	Craig, David, Papermaker, Portobello	1855
	Craig, James, Caledonian Distillery, Edinburgh	1850
	Craig, James, of Craigdarroch, New Cumnock	1857
	Craig, James H. Gibson, yr. of Riccarton, Hermiston	1863
	Craig, John, Guelt, Old Cumnock	1857
780	Craig, John, Littlehill, Bishopbriggs	1857
	Craig, Joseph, of Threecrofts, Lochrutton	1860
	Craig, Robert, Buckley, Bishopbriggs	1857
	Craig, William, Writer, Dumfries	1859
	Craig, William C., Anneston, Biggar	1855
	Craig, William, Craig Villa, New Cumnock	1862
	Craigie, David, Banker, Perth	1842
	Craigie, James, Easter Tarsappie, Perth	1861
	Craigie, Lawrence, of Glendoick, Perth	1824
	Craigie, William Roper, Toman Droighue, Aberfeldy	1858
790	Cranston, James, Pathhead, Cockburnspath	1857
	Cranstoun, George Cranstoun Trotter, of Dewar, Ayton	1849
	Cranstoun, William S., Dyke, Moffat	1859
	Craster, John, younger of Craster, Alnwick	1856
	Crawford, Adam, Rhodes, North Berwick	1850

		Admitted
	Crawford, Alexander, Writer, Dunse	1853
	Crawford, Charles	1822
	Crawford, Daniel, Barnbeath, Kilbarchan	1860
	Crawford, James Coutts, of Overton, Strathaven	1855
	Crawford, John, of Auchinames, Ayr	1818
800	Crawford, John, The House of Tongue, Lairg	1854
	Crawford, Peter, Dumgoyach, Strathblane	1857
	Crawford, William, late of Doonside, Ayr	1836
	Crawford, William, Balgarvie, Perth	1860
	Crawford, W. S. Stirling, of Milton	1838
	Crawfurd, John	1819
	Craufurd, Will. Houison, of Craufurdland, Kilmarnock	1809
	Crerar, John, Bovain, Killin	1857
	Crerar, John, Easter Drumatherty, Dunkeld	1861
	Creyk, Dr Alexander, Pitchaish, Ballindalloch	1850
810	Crichton, Hew, Edinburgh	1838
	Crichton, Hew Hamilton, W.S., Edinburgh	1849
	Crichton, James Arthur, Advocate, Edinburgh	1847
	Crichton, John, of Linn, Dalry, Ayr	1849
	Crichton, William, Live Stock Agent, Haddington	1859
	Croall, John, Middlefield House, Edinburgh	1849
	Crombie, Alexander, of Thornton, Laurencekirk	1835
	Crombie, Alexander, yr. of Thornton, W.S., Edin.	1858
	Crombie, John, Edinburgh	1861
	Cromarty, Wm., St Margaret's Hope, Orkney	1857
820	Cross, David, Seed-Merchant, Glasgow	1845
	Cross, Robert, Hiltown, Liberton	1852
	Cruickshank, Amos, Sittyton, Aberdeen	1858
	Cruickshank, Anthony, Aberdeen	1847
	Cruickshank, George, Comisty, Huntly	1852
	Cruickshank, John, Barmuckitry, Elgin	1854
	Cruickshank, John, Cloves, Elgin	1852
	Cruickshank, John B., Newton, Kinloss, Forres	1858
	Crum, Walter, of Thornliebank, Glasgow	1844
	Cumine, James, of Rattray, Peterhead	1847
830	Cumming, James, Dourie Bank, Port-William	1841
	Cumming, Robt. Crawford, of Barremman, Dumbarton	1857
	Cuninghame, Alexander, of Craigends, Johnstone	1844
	Cuninghame, David, Chapelton, Ardrossan	1850
	Cunliff, Richard Stedman, Glasgow	1857
	Cunningham, Alexander, of Balgownie, Culross	1841
	Cunningham, Alexander, Morebattle Tofts, Kelso	1841
	Cunningham, Alexander G., Rosebank, Currie	1854
	Cunningham, Andrew, Carlogie House, Carnoustie	1861

		Admitted
	Cunningham, Charles, Grahamshaw, Kelso	1863
840	Cunningham, J., of Lainshaw, Stewarton	1830
	Cunningham, John Sinclair, Seed-Merchant, Edin.	1852
	Cunningham, John, Whitecairn, Dalbeattie	1857
	Cunningham, Thomas, Dallachy, Aberdour	1851
	Cunningham, Thomas, Kirkettle, Roslin	1857
	Cunningham, William A., of Logan, Cumnock	1836
	Cunningham, Wm., Hole, Lennoxtown	1857
	Cunningham, W. C. S., of Caprington, Kilmarnock	1859
	Currie, Alexander, Advocate, P.C.S., Edinburgh	1836
	Currie, Andrew, Merchant, Kirkcaldy	1859
850	Currie, James, Halkerston, Gorebridge	1853
	Currie, William, of Linthill, Lilliesleaf	1863
	Curror, Adam, Myreside, Morningside	1849
	Curror, John, Comiston, Colinton	1848
	Curror, Robert, Polmaise, Stirling	1859
	Curry, Robert, Kelso	1851
	Cuthbertson, Archibald, Greendykes, Tranent	1822
	Cuthbertson, Donald, Accountant, Glasgow	1827
	Cuthbertson, William, Merchant, Glasgow	1836
	Cuthbertson, William, W.S., Edinburgh	1861
860	†DALKEITH, The Right Hon. William, Earl of, M.P.	1853
	DALHOUSIE, The Right Hon. Fox, Earl of, K.T.	1831
	DUNMORE, The Right Hon. Charles, Earl of	1862
	DUDLEY, The Right Hon. William, Earl of	1843
	DUPPLIN, The Right Hon. George, Viscount	1853
	DALRYMPLE, The Right Hon. John, Viscount	1845
	DUNFERMLINE, The Right Hon. Ralph, Lord, K.C.B.	1859
	DUNGLASS, The Right Hon. Charles, Lord	1860
	DRUMMOND, The Hon. Francis, Delvine, Dunkeld	1861
	DEAS, The Hon. Lord	1838
870	DUNBAR, Sir William, of Mochrum, Bart., M.P.	1845
	DALRYMPLE, Sir Hew, of North Berwick, Bart.	1841
	DUNBAR, Sir Archibald, of Northfield, Bart.	1839
	DUNBAR, Sir George, of Hempriggs, Bart.	1839
	DOUGLAS, Sir George H. Scott, of Springwood, Bart.	1851
	DUNDAS, Sir David, of Dunira, Bart.	1828
	DRUMMOND, Sir James Walker, of Hawthornden, Bart.	1834
	DAVIE, Sir Henry R. Ferguson, of Creedy, Bart., M.P.	1848
	Dale, John R., Auldhame, North Berwick	1851
	Dalgairns, Lieut.-Col., Balidgarsho, Coupar-Angus	1841
880	Dalgleish, Archibald, Glenmore, Oban	1854
	Dalgleish, James Ogilvie, of Woodburne, Ceres	1857

		Admitted
	Dalgleish, James, of Ardnamurchan, Edinburgh	1857
	Dalgleish, John J., yr. of Ardnamurchan, Edinburgh	1857
	Dalgleish, Laurence, Ardnamurchan, Mull	1858
	Dalgleish, Robert Bayne, of Dura, Cupar-Fife	1848
	Dalglish, Robert, of Killmardinny, M.P., Glasgow	1857
	Dalmahoy, Patrick, W.S., Edinburgh	1862
	Dalrymple, Charles, of Hailes, Musselburgh	1862
	Dalrymple, James, of Woodhead, Kirkintilloch	1857
890	Dalrymple, James, of Langlee, Galashiels	1859
	Dalzell, Allen, M.D., Edinburgh	1857
	Dalzell, James Allen, North Berwick	1835
	Dalziel, Alexander, Glenwharrie, Sanquhar	1860
	Dalziel, George, Merkland, Thornhill	1860
	Darling, Adam, Berwick	1857
	Darling, James Stormonth, of Lednathie, Kelso	1863
	Darling, James Stormonth, junior, W S., Edinburgh	1863
	Darling, James, Westhall, Innerwick	1860
	Darling, Thomas, Mordington Mains, Berwick	1863
900	Darling, William, Linplum, Haddington	1839
	Darroch, Major Duncan, of Gourock, Greenock	1840
	Davidson, Adam, Nairn	1855
	Davidson, Alex., Mains of Cairnbrogie, Old Meldrum	1855
	Davidson, Duncan, of Tulloch, Dingwall	1824
	Davidson, George, Townhead, Balerno	1847
	Davidson, George, Cairnfechle, Udny	1858
	Davidson, George, Walton, Linlithgow	1860
	Davidson, Henry, Muirhouse, Edinburgh	1848
	Davidson, Henry M., Sheriff-Clerk of Haddingtonshire	1841
910	Davidson, Hugh, The Customs, Wick	1839
	Davidson, John, Brathins, Banchory	1857
	Davidson, Lawrence, W.S., Edinburgh	1829
	Davidson, Patrick, of Inchmarlo, Aberdeen	1834
	Davidson, William, Oldhall, Thurso	1833
	Davidson, William James, of Ruchill, Glasgow	1850
	Davison, John, Trittington House, Morpeth	1852
	Dawson, John, Swinton Bridge End, Coldstream	1859
	Dawson, Rev. Thos. H., Monymusk	1858
	Dawson, William, Mannerston, Linlithgow	1857
920	Dean, John, Mains of Balquhain, Keith Hall	1856
	Deans, Henry, East Fenton, Drem	1850
	Deans, James Young, of Kirkstyle, Kilmarnock	1857
	Deans, John, Penston, Gladsmuir	1841
	Deans, Peter D., Penston, Gladsmuir	1850
	Dempster, George, of Skibo, Dornoch	1823

		Admitted
	Dempster, George H., of Dunnichen, Forfar	1857
	Denholm, Alexander, Batelaws, Biggar	1854
	Denholm, David, Cauldcoats, Liberton	1854
	Dennistoun, Alexander, junior, Golfhill, Glasgow	1850
930	Dennistoun, John, Glasgow	1838
	Dennistoun, Richard, Southport	1855
	Denoon, David, Merchant, London	1839
	Dewar, Lt.-Colonel Alexander Cumming, Edinburgh	1832
	Dewar, Daniel, Portbane Cottage, Kenmore	1860
	Dewar, Gilbert Innes, Bonnyside, Denny	1860
	Dewar, James, of Vogrie, Ford	1842
	Dewar, John, Wine Merchant, Perth	1861
	Dick, Dr John, Broombank, Mid-Calder	1856
	Dick, William, Veterinary College, Edinburgh	1840
940	Dick, William Douglas, of Montrave, Kennoway	1828
	Dickenson, William, Longcroft, Lauder	1859
	Dickie, John, Seedsman, Kilmarnock	1857
	Dickson, Alexander, Hermiston	1848
	Dickson, Archibald, Bughtrig, Coldstream	1854
	Dickson, Archibald, of Huntlaw	1823
	Dickson, George, of Huntlaw	1830
	Dickson, James, Dykemill, Moffat	1859
	Dickson, James Jobson, Accountant, Edinburgh	1850
	Dickson, James Anderson, Banker, Arbroath	1858
950	Dickson, John, Saughton Mains, Murrayfield	1844
	Dickson, John Heatly, Saughton Mains, Murrayfield	1862
	Dickson, John, W.S., Perth	1846
	Dickson, John F., Panbride House, Carnoustie	1858
	Dickson, Peter, 28 Upper Brook Street, London	1858
	Dickson, Thomas, of Crochmore, Durrisdeer	1860
	Dingwall, Walter, New Register House, Edinburgh	1849
	Dingwall, William, Ramornie, Ladybank	1851
	Dirom, Captain Thos. Pasley, of Mount Annan, Annan	1860
	Dixon, Lieutenant-Colonel H., Grantown	1856
960	Dixon, Thomas G., Rhyl	1849
	Dobie, David, Tinwald Park, Dumfries	1862
	Dodd, Nicholas, of Smalesmouth, Nisbet, Kelso	1863
	Dodd, James, Mossburnford, Jedburgh	1863
	Dodd, William, Merchant, Glasgow	1837
	Doddrell, George J., Glasgow	1857
	Dodds, John, Cranston Riddell, Dalkeith	1844
	Dods, Alexander, Stonefieldhill, Lasswade	1859
	Dods, William, Seed Merchant, Haddington	1850
	Dods, William, Elwartlaw, Greenlaw	1863

		Admitted
970	Don, Alexander, Keirsbeath, Crossgates	1858
	Donald, James, Waulkmill, Midmar	1858
	Donald, Robert, Largiebeg, Campbeltown	1857
	Donald, William, Australia	1857
	Donald, William, Viewfield, Elgin	1854
	Donaldson, James, of Keppoch, Dumbarton	1845
	Dougal, John, of Glenferness, Nairn	1844
	Dougall, Capt. Maitland, of Scotscraig, Tayport	1857
	Douglas, Alexander Forbes, Mount Teviot, Jedburgh	1854
	Douglas, Bentlem, Cairntows, Liberton	1858
980	Douglas, Francis Brown, Advocate, Edinburgh	1839
	Douglas, George, Riddletonhill, Maxton	1861
	Douglas, James, Athelstaneford, Drem	1848
	Douglas, John, Tinnis, Selkirk	1862
	Douglas, Robert Johnstone, of Lockerbie	1842
	Douglas, Thomas, Clyth, Lybster	1861
	Douie, Andrew, Blair-Adam	1851
	Dove, John, Eccles Newtown, Kelso	1853
	Dove, William, Wark, Coldstream	1845
	Dowell, Alexander, Royal Circus, Edinburgh	1858
990	Downie, Alexander, Merchant, Glasgow	1835
	Downie, John, Merchant, Glasgow	1838
	Drain, Daniel, Crossibeg, Campbeltown	1857
	Drennan, James, Holmston, Ayr	1857
	Drew, Laurence, Merryton, Hamilton	1850
	Drew, Peter, Carmyle, Tollcross, Glasgow	1854
	Drife, James, Barr, Sanquhar	1857
	Drimmie, Daniel, Panmure Bleachfield, Dundee	1843
	Dron, William, Crieffvechter, Crieff	1861
	Drummond, George Home, yr. of Blair-Drummond	1835
1000	Drummond, Henry Home, of Blair-Drummond	1809
	Drummond, Henry, Seedsman, Stirling	1859
	Drummond, John, of Balquhandy, Dunning	1854
	Drummond, John Murray, of Megginch, Errol	1852
	Drummond, Thomas, of Newton	1828
	Drummond, William, Banker, Cupar-Fife	1837
	Dryburgh, Thomas, Brewer, Edinburgh	1858
	Drysdale, Andrew, Myreton, Stirling	1858
	Drysdale, William, yr. of Kilrie, Kinghorn	1861
	Dudgeon, James, Fodderty, Dingwall	1850
1010	Dudgeon, John, Spylaw, Kelso	1840
	Dudgeon, John Scott, Spylaw, Kelso	1862
	Dudgeon, John, Almondhill, Kirkliston	1847
	Dudgeon, John B., Crakaig, Golspie	1856

		Admitted
	Dudgeon, Patrick, of Cargen, Dumfries	1851
	Dudgeon, Robert, Merchant, Liverpool	1828
	Dudgeon, Robert, Humbie, Winchburgh	1849
	Duff, Rev. David, D.D., Minister of Kenmore	1839
	Duff, Lauchlan Duff Gordon, of Drummuir, M.P.	1858
	Duff, Thomas, Perthshire Agric. Coy., Perth	1861
1020	Duguid, Peter, of Cammachmore, Advoc., Aberdeen	1858
	Dun, John, of Gilston, Galashiels	1863
	Dun, William, of Craigton, Fintry	1857
	Dunbar, Lewis, Tullochgriban, Carr Bridge	1856
	Dunbar, Lieutenant-Colonel P., London	1823
	Duncan, Alexander, of Providence, Rhode Island	1851
	Duncan, Alexander, Leuchars Castle, Leuchars	1857
	Duncan, David H., Friock Mains, Arbroath	1858
	Duncan, George, Dundee	1843
	Duncan, George, Balchristie, Colinsburgh	1838
1030	Duncan, James, Merchant, Leith	1826
	Duncan, John, Newseat of Tolquhon, Tarves	1855
	Duncan, John, Ardo, Methlic	1858
	Duncan, Robert, Kirkmay, Crail	1855
	Duncan, William, S.S.C., Edinburgh	1848
	Dundas, George, Advocate, Sheriff of Selkirkshire	1846
	Dundas, Joseph, of Carronhall, Falkirk	1862
	Dundas, Vice-Admiral Henry, Craigroyston, Edin.	1842
	Dundas, Robert, of Arniston, Gorebridge	1847
	Dunlop, Alex. Murray, of Corsock, M.P., Edin.	1828
1040	Dunlop, Alexander, Glasgow	1857
	Dunlop, Archibald, 5 Gloucester Terrace, London	1823
	Dunlop, George, Edinburgh	1849
	Dunlop, Henry, of Craigton, Glasgow	1838
	Dunlop, James, of Doonside, Largs	1844
	Dunlop, James, of Arthurlee, Barrhead	1844
	Dunlop, John, Duddingstone, Portobello	1836
	Dunlop, John, Whiteshawgate, Strathaven	1857
	Dunlop, John, Clermiston, Corstorphine	1859
	Dunlop, William H., of Annanhill, Kilmarnock	1853
1050	Dunn, Adam, Tranent Mains, Tranent	1854
	Dunn, Alexander, Wester Leochel, Craigievar	1858
	Dunn, David, Berryhill, Kelso	1863
	Dunn, John, Wester Innenteer, Craigievar	1858
	Dunn, William, Roxburgh Mains, Kelso	1853
	Durie, David, Nether Mill, Fettercairn	1858
	Durie, Robert Hogg, Standingstone, Haddington	1855
	Duthie, Alexander, Advocate, Aberdeen	1847

Admitted

Dykes, F. L. B., of Devonby Hall, Cumberland 1845
Dyson, Thos. C., of Willowfield, Halifax, Yorkshire 1832

1060 ESTERHAZY, His Highness the Prince, Hungary, Honorary Associate 1836
ERROL, The Right Hon. William, Earl of 1854
EGLINTON and WINTON, The Right Hon. Archibald, Earl of 1863
†ELGIN and KINCARDINE, The Right Hon. James, Earl of, K.T. 1842
ELCHO, The Right Hon. Francis, Lord, M.P. 1847
ELIBANK, The Right Hon. Alexander, Lord 1836
ELPHINSTONE, The Right Hon. William, Lord 1860
ELIOTT, Sir William Francis, of Stobbs, Bart. 1823
EDMONSTONE, Sir Archibald, of Duntreath, Bart. 1821
ELPHINSTONE, Sir James Dalrymple Horn, of Horn and Logie-Elphinstone, Bart., M.P. 1840
1070 ERSKINE, Sir Thomas, of Cambo, Bart. 1860
Easson, Robert, Mains of Errol, Errol 1860
Eddison, Edwin, Headingly Hill, Leeds 1850
Edgely, Thomas, Gilmerton, Edinburgh 1857
Edmond, John, Croftamie, Drymen 1857
Edmonds, Leonard, Grafton Street, London 1858
Edward, Allan, Merchant, Dundee 1843
Edwards, Mathew, Hilton, Alloa 1859
Elder, James, Whitehill Mains, Liberton 1854
Elder, James, Bearford, Haddington 1857
1080 Elder, Thomas, Amisfield Mains, Haddington 1854
Ellice, Edward, yr. of Glenquoich, M.P. 1836
Elliot, Adam, M.D., Goldielands, Hawick 1852
Elliot, Henry, Lanton, Jedburgh 1857
Elliot, James, Lamberton, Berwick 1854
Elliot, James, Galalaw, Kelso 1853
Elliot, John, Primrosehill, Dunse 1854
Elliot, Robert, Laighwood, Dunkeld 1848
Elliot, Robert Kerr, of Clifton, Kelso 1849
Elliot, Thomas, Hindhope, Jedburgh 1852
1090 Elliot, Thomas, Blackhall, Galashiels 1854
Elliot, Walter, Hollybush, Galashiels 1860
Elliot, Walter, of Wolflee, Hawick 1861
Elphinstone, Lieutenant-Colonel John 1827
Embleton, John, Broomhouse, Berwick-on-Tweed 1854
Errington, Rowland, of Sandhoe, Northumberland 1841
Erskine, Henry David, of Cardross, Port of Monteith 1862

		Admitted
	Erskine, Rear-Admiral John, Cardross	1859
	Erskine, James, of Shielfield, Melrose	1849
1100	Erskine, Thomas, of Linlathen, Dundee	1843
	Euing, William, Glasgow	1857
	Ewen, Robert, Westown, Tarland	1858
	Ewing, Alexander, Woodside Place, Glasgow	1844
	Ewing, Alex. Crum, yr. of Strathleven, Dumbarton	1857
	Ewing, Arch. Orr, of Ballikinrain, Balfron	1851
	Ewing, Humphrey Ewing Crum, of Strathleven, M.P.	1857
	Ewing, James Lindsay of Caldercruix, Glasgow	1844
	Ewing, John Leckie, yr. of Arngomery, Stirling	1857
	Ewing, John Orr, of Ratho	1838
1110	Ewing, Robert, Merchant, Greenock	1830
	Ewing, William, Stirling	1858
	Ewing, William Leckie, of Arngomery, Stirling	1835
	†Fife, The Right Hon. James, Earl of, K.T.	1840
	Forbes, The Right Hon. Walter, Lord	1833
	Flahault, Charles, Count Mercer de	1821
	Forbes, Sir John Stuart, of Pitsligo, Bart.	1830
	Forbes, Sir William, of Craigievar, Bart.	1857
	Fergusson, Sir James, of Kilkerran, Bart., M.P.	1854
	Forbes, Sir Charles, of Newe and Edinglassie, Bart.	1828
1120	Fair, James S. Elliot, of Langlee, Jedburgh	1854
	Fair, John S. Elliot, Gilliestongues, Jedburgh	1863
	Fairholme, William, of Chapel, Lauder	1861
	Fairlie, James Ogilvie, of Coodham, Kilmarnock	1837
	Fairrie, John, Merchant, London	1831
	Fairweather, Robert, Craigend, Brechin	1855
	Falconar, George, Kinloch, Ladybank	1835
	Falconar, John, Arnbarrow, Fettercairn	1858
	Falconer, Donald, Connonsyth, Arbroath	1858
	Falconer, Peter, Disblair, Summerhill, Aberdeen	1851
1130	Falshaw, James, Civil Engineer, Edinburgh	1849
	Farie, James, of Farme, Glasgow	1850
	Farish, Samuel, Kirklands, Lockerbie	1860
	Farquhar, Arthur, W.S., of Elsick, Stonehaven	1852
	Farquharson, Francis, of Finzean, Edinburgh	1850
	Farquharson, Major-General Francis	1843
	Farquharson, Francis, Builder, Haddington	1856
	Farquharson, James, Auchinblae	1852
	Farquharson, Major John, of Corrachrie, Tarland	1841

		Admitted
	Farquharson, Robert, of Allargue, Strathdon	1845
1140	Farquharson, Robert, of Haughton, Alford	1857
	Farrell, Alfred Herbert Wm., Davo Mains, Fordoun	1858
	Farrell, Michael, of Woodburnden, Fordoun	1857
	Fell, William Edwin Cotton, Edinburgh	1854
	Fender, Robert, Rules Mains, Dunse	1863
	Fenton, John, Mill of Mains, Dundee	1843
	Fenwick, John, North House, Hawick	1862
	Fergus, John, of Strathore	1832
	Ferguson, Vice-Admiral George, of Pitfour, Mintlaw	1828
	Ferguson, James D., Richmond, Yorkshire	1852
1150	Ferguson, John, of Knockindale	1824
	Ferguson, John, Burghlee, Loanhead	1863
	Ferguson, John, East Grange, Elgin	1855
	Ferguson, John, Brae of Coynach, Ellon	1860
	Ferguson, John, of Kilquhanity, Dalbeattie	1846
	Ferguson, Lieut.-Colonel Robert, of Raith	1845
	Ferguson, Thomas, Kinnochtry, Coupar-Angus	1858
	Fergusson, Muir, of Middlehaugh, Pitlochry	1842
	Fergusson, Samuel R., London	1836
	Fernie, John Carmichael, Easter Kellie, Pittenweem	1853
1160	Ferrier, Robert, Cardross Mill, Cardross	1861
	Fettes, James, Surgeon, Laurencekirk	1850
	Findlay, Major, of Baturrich, Dumbarton	1857
	Findlay, Robert, Springhill, Baillieston, Glasgow	1855
	Findlay, Thomas Dunlop, Easterhill, Glasgow	1847
	Findlay, William, of Moss, Killearn	1851
	Finlay, Alex. S., of Castle Toward, M.P., Dunoon	1844
	Finlay, John, New Farm, Lochgelly	1859
	Finlay, William, Brakenbrae, Bishopbriggs	1857
	Finlayson, James, Prora, Drem	1859
1170	Finlayson, John, Factor, Lochalsh	1859
	Finnie, James, of Newfield, Dundonald	1853
	Fisher, Daniel, S.S.C., Edinburgh	1819
	Fisher, Donald, Pitlochrie	1861
	Fisher, James, M.D.	1821
	Fleming, Alexander, Avon Mills, Hamilton	1850
	Fleming, Andrew, Mains of Fullwood, Paisley	1852
	Fleming, James, Coats, Penicuik	1857
	Fleming, James, Holm, Stonehouse	1857
	Fleming, James, Three-Mile-Town, Linlithgow	1854
1180	Fleming, John, Ballindalloch	1857
	Fleming, John, Hawkwood, Strathaven	1857
	Flemyng, Robert Stewart	1826

		Admitted
	Fletcher, Angus, of Dunans, Edinburgh	1826
	Fletcher, Archibald, Tyndrum	1857
	Fletcher, Major C. E.	1848
	Fletcher, Donald, of Bernice, Kilmun	1857
	Fletcher, Dugald, Ballachindrain, Cairndow	1853
	Fletcher, John, yr. of Salton, Haddington	1857
	Flockhart, John, Charleton, Colinsburgh	1861
1190	Flockhart, William, Flockhouse, Blair Adam	1861
	Forbes, Arthur, of Culloden, Inverness	1850
	Forbes, Charles Henry, of Kingairloch, Bonaw	1836
	Forbes, Charles William	1856
	Forbes, Dugald, Writer, Glasgow	1847
	Forbes, George, Merchant, London	1830
	Forbes, George, Parkhead Villa, Perth	1835
	Forbes, James D., D.C.L., Principal of St Andrews	1836
	Forbes, James Stewart, Edinglassie, Strathdon	1830
	Forbes, James Ochoncar, of Corse, Whitehouse	1862
1200	Forbes, Major John, of Inverernan, C.B., Strathdon	1842
	Forbes, John, of Haddo, Forgue	1850
	Forbes, Patrick, of St Catherine's, Edinburgh	1834
	Forbes, William, of Medwyn, Edinburgh	1835
	Forbes, William, of Callendar, Falkirk	1860
	Ford, William, Hardengreen, Dalkeith	1849
	Fordyce, Captain A. Dingwall, of Brucklay, Mintlaw	1847
	Forlong, William, of Erins, Tarbert	1838
	Forman, John Nairne, W.S., Edinburgh	1831
	Forman, Robert, Keith House, Dalkeith	1852
1210	Forrest, David, Allanton, Hamilton	1857
	Forrest, James, junior, Kirriemuir	1843
	Forrest, Peter, Haggs, Ratho	1863
	Forrest, William, Allanton, Hamilton	1863
	Forrester, John, W.S., Edinburgh	1842
	Forrester, William, Edinburgh	1851
	Forrester, William, Wedderburn Mains, Edrom	1854
	Forrester, W. A., of Barns, Peebles	1842
	Forsyth, John, Arabella, Parkhill, Tain	1855
	Fortune, George, Barnsmuir, Crail	1857
1220	Fortune, William R., of Muircambus, Colinsburgh	1854
	Foster, William, Engineer, Lincoln	1859
	Fothringham, Captain T. F. S., of Fothringham, Forfar	1859
	Foulds, William, of Skirnieland, Kilmarnock	1833
	Foulis, Robert, M.D., Edinburgh	1861
	Fowler, Andrew, Seed Merchant, Glasgow	1855
	Fowler, Henry Mackenzie, of Raddery, Fortrose	1846

		Admitted
	Fox, Michael, junior	1849
	Fox, Richard M., of Foxhall, Rathowen, Ireland	1838
	Foyer, David, Knowehead, Campsie	1857
1230	Fraser, Alexander, City Chamberlain, Aberdeen	1841
	Fraser, Alexander, Faillie, Inverness	1857
	Fraser, Colonel Alexander, Royal Engineers	1818
	Fraser, Andrew, W.S., Sheriff-Sub., Fort-William	1840
	Fraser, Archd. Thos. Fred., of Abertarff, Inverness	1820
	Fraser, Colonel Charles, of Castle Fraser, Cluny	1816
	Fraser, Evan Baillie, Inverness	1840
	Fraser, Hugh, Abersky, Inverness	1840
	Fraser, Hugh, Balloch of Culloden, Inverness	1853
	Fraser, Hugh, Calcutta	1856
1240	Fraser, John, London	1840
	Fraser, John, of Bunchrew, Inverness	1856
	Fraser, John, East Pinkerton, Dunbar	1860
	Fraser, Patrick Allan, of Hospitalfield, Arbroath	1854
	Fraser, Patrick, Sheriff of Renfrewshire	1863
	Fraser, Robert, Brackla, Nairn	1839
	Fraser, Sweton, Auchernack, Grantown	1854
	Fraser, Rear-Admiral Thomas, Portobello	1817
	Fraser, William, Peel, Tibbermuir	1861
	Fraser, William, Bone Mills, Broxburn	1857
1250	Fraser, William, W.S., Edinburgh	1837
	Fraser, William, of Kilmuir, Skye	1852
	Fraser, William Sutherland, Banker, Dornoch	1850
	Frazer, John, Overton, New Abbey	1858
	Frederick, David, Drumbreddon, Stranraer	1857
	Freeland, Robert, of Gryffe Castle, Bridge of Weir	1835
	French, James, Lampits, Carnwath	1855
	French, Dr James, C.B., Edinburgh	1853
	Frew, James, Balmalloch, Kilsyth	1858
	Friar, Thomas, of Griden Ridge, Etal	1854
1260	Fullarton, Gavin, of Kerelaw, Stevenston	1844
	Fullerton, Captain James	1824
	Fullerton, William, Mains of Ardestie, Dundee	1852
	Fulton, Andrew, Saddler, Edinburgh	1857
	Fulton, William, Hatchetnize, Coldstream	1863
	Fyfe, John, of Dalmarnoch, Glasgow	1847
	Fyfe, Robert, junior, Arlary, Kinross	1861
	GORDON, Her Grace Elizabeth, Duchess of	1834
	†GALLOWAY, The Right Hon. Randolph, Earl of	1830

		Admitted
	†Glasgow, The Right Hon. James, Earl of	1822
1270	Garlies, The Right Hon. Alan, Viscount	1860
	Gray, The Right Hon. John, Lord	1821
	Grierson, Sir Alex. William, of Rockhall, Bart.	1860
	Grant, Sir G. Macpherson, of Ballindalloch, Bart.	1859
	Gladstone, Sir Thomas, of Fasque, Bart.	1834
	Grant, Lieut.-Gen. Sir Patrick, G.C.B.,	1862
	Gairdner, Charles Dalrymple, Auchans, Dundonald	1853
	Gairdner, Robert, Banker, Kilmarnock	1858
	Galbraith, Alexander, Merchant, Glasgow	1850
	Galbraith, Alexander, Croy, Cunningham, Killearn	1857
1280	Galbraith, Andrew, Merchant, Glasgow	1850
	Galbraith, David Stewart, late of Machrihanish	1812
	Galbraith, William, of Blackhouse, Stirling	1822
	Galloway, Alexander, Land-Agent, Glasgow	1850
	Galloway, David, Cairnie, Glencarse	1861
	Gamgee, John, New Veterinary College, Edinburgh	1859
	Garden, Archibald, Netherton, Forres	1859
	Garden, William, M.D., Balfluig, Aberdeen	1850
	Garden, William, Braco Park, Fraserburgh	1857
	Gardiner, George, Carrington Barns, Lasswade	1857
1290	Gardiner, James, Lanton, Mid-Calder	1855
	Gardner, Hamilton Gray, W.S.	1844
	Gardner, James, Pharmaceutical Chemist, Edinburgh	1859
	Gardner, John	1844
	Gardiner, Robert, Lowbank, Auchterarder	1861
	Gardner, Robert, Traquair Knowe, Peebles	1855
	Gardner, Robert, City of Glasgow Bank, Whitburn	1855
	Garland, John, Cairnton, Laurencekirk	1849
	Garland, Thomas, junior, Ardlethen, Ellon	1851
	Gartshore, John Murray, of Gartshore, Kirkintilloch	1825
1300	Gatherer, George, Writer, Elgin	1854
	Gaukroger, George, Wool-Merchant, Haddington	1859
	Gebbie, William, of Hazledean, Strathaven	1853
	Geddes, James, Orbliston, Fochabers	1843
	Geddes, Lieut.-General John, K.H., Edinburgh	1842
	Geekie, Alexander, of Baldowrie, Coupar-Angus	1837
	Geekie, Peter, Balboughty, Perth	1837
	Geekie, Peter M., Cortachy, Kirriemuir	1861
	Geekie, Robert, of Rosemount, Blairgowrie	1843
	Geils, John Edward, of Dumbuck, Dumbarton	1844
1310	Gemmel, Thomas, Dalrioch, Campbeltown	1857
	Gentle, Robert, Dell, Inverness	1840

		Admitted
	Gerard, Archibald, of Rochsoles, Airdrie	1842
	Gibb, David, Bridge of Dye, Banchory-Ternan	1855
	Gibbon, Alexander, of Johnston, Laurencekirk	1834
	Gibbons, Edward, Portree, Skye	1830
	Gibbs, B. T. Brandreth, London	1849
	Gibson, Charles, Pitlochry	1861
	Gibson, James, Downieken, Dundee	1858
	Gibson, James, The Shaws, Selkirk	1863
1320	Gibson, John, W.S., Edinburgh	1825
	Gibson, John, jun., W.S., Edinburgh	1828
	Gibson, John, Woolmet, Dalkeith	1847
	Gibson, John, Eastfield, Wiston, Biggar	1853
	Gibson, John, Tallowquhairn, Dumfries	1860
	Gibson, Robert, Windydoors, Stow	1859
	Gibson, Thomas, Ferniehirst, Stow	1863
	Gibson, William W., Bonnington House, Edinburgh	1859
	Gilbert, John Graham, of Yorkhill, Partick	1847
	Giles, James, of Kailzie, Peebles	1842
1330	Gilkison, Robert, jun., Glasgow	1848
	Gillanders, F. M., of Newmore, Invergordon	1844
	Gillanders, James F., of Highfield, Beauly	1854
	Gillespie, Alexander, Merchant, London	1836
	Gillespie, David, of Mountquhannie, Cupar-Fife	1841
	Gillespie, David, Highlaw, Lockerbie	1860
	Gillespie, James, Craigie, Cramond	1849
	Gillespie, James, Annanbank, Lockerbie	1850
	Gillespie, James, Gateside, Douglas	1860
	Gillespie, John, W.S., Edinburgh	1846
1340	Gillespie, Robert, Merchant, London	1829
	Gillespie, Thomas, Parkhall, Douglas	1842
	Gillison, Thomas, Old Swan, Liverpool	1862
	Gillon, Andrew, of Wallhouse, Bathgate	1848
	Gilmour, Allan, of Eaglesham, Glasgow	1849
	Gilmour, John, of Mount Vernon, Row	1863
	Gilmour, Matthew, Town of Inchinnan	1857
	Gilmour, Walter James Little, of Craigmillar	1828
	Girdwood, Robert, Tanfield, Edinburgh	1855
	Gladstone, Robertson, Merchant, Liverpool	1841
1350	Gladstone, Thomas Stewart, of Capenoch, Thornhill	1853
	Glasgow, Alexander, of Old Court, Cork	1847
	Glassford, James Glassford Gordon, of Dugaldstone	1861
	Glegg, John, Factor, Milliken House, Johnstone	1857
	Glen, John, Merchant, Edinburgh	1847

		Admitted
	Glen, Robert R., Banker, Linlithgow	1860
	Glen, Thomas, Hillhead, Paisley	1853
	Glen, William, Hawkhead Mains, Paisley	1850
	Glendinning, George, Hatton Mains, Ratho	1849
	Glendinning, George, Rawfarm, Mid-Calder	1861
1360	Glendinning, Peter, Dalmeny Park, So. Queensferry	1848
	Glendinning, Robert W., Broomdykes, Ayton	1854
	Glennie, Arthur, Fernyflat, Bervie	1851
	Glover, Andrew, Lanrick Castle, Doune	1859
	Glover, Robert, Shandon, Drymen	1857
	Goodlet, William, Beauchamp, Arbroath	1851
	Goodsir, John, Professor of Anatomy, University of Edinburgh	1846
	Gordon, Adam Hay, of Avochie, W.S., Edinburgh	1846
	Gordon, Alexander, of Ellon	1808
	Gordon, Alexander, of Newton, Insch	1841
1370	Gordon, Arthur Forbes, of Rayne, W.S., Edinburgh	1850
	Gordon, Charles, of Auchleuchries, Cruden	1832
	Gordon, Vice-Admiral Charles, Huntly	1835
	Gordon, Charles K. Johnstone, of Craig, K.L.S.	1839
	Gordon, Charles Napier, of Eslemont, Ellon	1840
	Gordon, David A., of Culvennan, Castle-Douglas	1860
	Gordon, Edward Stratherne, Sheriff of Perthshire	1840
	Gordon, George, America	1829
	Gordon, George, Tullochallum, Craigellachie	1860
	Gordon, Harry George, of Killiechassie, Dunkeld	1855
1380	Gordon, Henry, Sheriff-Clerk, Dumfries	1860
	Gordon, James, of Ivy Bank, Nairn	1813
	Gordon, James, of Manar, Keithhall	1835
	Gordon, Captain James Alex., Ittingston, Huntly	1862
	Gordon, John, of Aikenhead, Cathcart	1838
	Gordon, John, Lettoch, Glenlivet	1853
	Gordon, John, Ballintomb, Grantown.	1856
	Gordon, John, of Cluny, Aberdeenshire	1861
	Gordon, John, Uppertown of Towie, Mossat	1858
	Gordon, John Taylor, of Nethermuir, New Deer	1831
1390	Gordon, John Thomson, Sheriff of Edinburgh	1841
	Gordon, Peter Laing, of Craigmyle, Torphins	1834
	Gordon, Richard, of Halmyre, Leadburn	1845
	Gordon, Robert Macartney, of Rattra, Kirkcudbright	1846
	Gordon, R. H., Coul, Laggan	1863
	Gordon, Tho. Dempster, of Balmaghie, Castle-Douglas	1863
	Gordon, William, Aberdeen	1847

		Admitted
	Gordon, William Cosmo, of Fyvie, Aberdeen	1847
	Gorrie, John, Innerdunning, Dunning	1859
	Gorrie, Thomas, Wire-Manufacturer, Perth	1861
1400	Gow, James, Bankend, Denny	1854
	Gow, John L., Raith, Kirkcaldy	1851
	Gowans, James, Rockville, Edinburgh	1860
	Gracie, John, Castlehill, Peebles	1855
	Græme, Robert, of Welhall, Hamilton	1853
	Graham, Alexander, of Capilly, Neilston	1844
	Graham, Alexander, Summerston, East Kilpatrick	1854
	Graham, Alexander, of Kirkhill, Stirling	1859
	Graham, Carolus J. Home, Edinburgh	1862
	Graham, Frederick	1821
1410	Graham, George	1817
	Graham, Henry, Auckland, New Zealand	1855
	Graham, Humphrey, W.S., Edinburgh	1819
	Graham, James, Braidlie, Canonbie	1862
	Graham, James Maxtone, of Redgorton, Stanley	1848
	Graham, James	1827
	Graham, James, of Fereneze, Neilston	1843
	Graham, James, Meikle Culloch, Dalbeattie	1851
	Graham, John, Pearsie, Kingoldrum	1843
	Graham, John, of Shaw, Lockerbie	1852
1420	Graham, John Murray, of Murrayshall, Perth	1842
	Graham, Robert, Buccleuch Street, Hawick	1860
	Graham, William Cunningham, of Gartmore	1853
	Graham, Thomas, of Ballewan, M.D., F.R.S., Master of the Mint, London	1849
	Graham, William, Writer, Glasgow	1828
	Graham, Colonel William, of Mossknow, Ecclefechan	1834
	Graham, William, jun., of Finnartmore, Kilmun	1844
	Graham, William, of Devonshaw, Dollar	1854
	Graham, William, jun., Lairg	1855
	Graham, William Stirling, of Airth, Falkirk	1833
1430	Grahame, Barron, of Morphie, London	1853
	Granger, John, Perth	1861
	Grant, Archibald, younger of Monymusk, Aberdeen	1854
	Grant, Charles, Hazelbank, Glen Urquhart	1862
	Grant, Colin Campbell, W.S., Edinburgh	1859
	Grant, Duncan, of Bught, Inverness	1825
	Grant, Francis William, Monymusk, Aberdeen	1858
	Grant, Hay Macdowall, of Arndilly, Craigellachie	1852

		Admitted
	Grant, Rev. James, D.D., D.C.L., Chaplain to the Society	1828
	Grant, James Augustus, of Viewfield, Nairn	1840
1440	Grant, James Murray, of Glenmorriston, Inverness	1810
	Grant, James, Clashnoir, Ballindalloch	1859
	Grant, John, of Kilgraston, Bridge of Earn	1819
	Grant, John, Glengrant, Elgin	1854
	Grant, John, Hotel, Nairn	1857
	Grant, John, Burnside, Grandtully, Aberfeldy	1860
	Grant, John Peter, W.S., Edinburgh	1823
	Grant, Kenneth, Kinnellan, Dingwall	1853
	Grant, Patrick, W.S., Sheriff-Clerk, Inverness	1836
	Grant, Robert, of Kincorth, Forres	1826
1450	Grant, Robert, of Druminnor, Rhynie	1841
	Grant, Thomas Macpherson, of Craigo, Montrose	1846
	Grant, Walter Colquhoun	1844
	Grant, William, Spittal of Glenshee, Blairgowrie	1861
	Grant, William, Drumdelgie, Huntly	1862
	Grant, William, younger of Elchies, Craigellachie	1833
	Grant, William, Australia	1839
	Grant, William Forsyth, of Ecclesgreig, Montrose	1849
	Grant, W. P., of Rothiemurchus, Lynwilg	1821
	Grassick, Charles	1830
1460	Grassick, John, Craighead of Turtory, Rothiemay	1829
	Gray, Alexander, Potholm, Langholm	1859
	Gray, Andrew Farquhar, of Glentig, Ayr	1835
	Gray, Donald, Corrish, Golspie	1856
	Gray, George, Windyyett, Avonbridge, Falkirk	1857
	Gray, George, Whitemyres, Aberdeen	1858
	Gray, James, Bearside, Stirling	1851
	Gray, John, Merchant, Greenock	1831
	Gray, John, Bonally Tower, Colinton	1848
	Gray, John, Uddingston, Glasgow	1856
1470	Gray, Patrick, Broadyetts, Uphall	1854
	Gray, James, Braehead Mains, Cramond	1861
	Gray, Thomas, Coul, Markinch	1854
	Gray, Thomas, Spean Lodge, Unachan	1858
	Gray, William, Kingston, Drem	1849
	Gray, William, Southfield, Portobello	1849
	Gray, William, Brownrigg, Drem	1855
	Green, William, Ruthrie, Craigellachie	1857
	Greenhill, David, of Glenforsa, Oban	1842
	Greenshields, John, of Kerse, Lesmahagow	1829

		Admitted
1480	Greg, John, Oatfield, Campbeltown	1850
	Gregorson, Angus, Banker, Oban	1851
	Gregory, Alex. Allan, Corn-Merchant, Inverness	1854
	Gregory, Arthur Thomas, of Buchromb, Mortlach	1833
	Greig, Thomas, of Glencarse, Perth	1852
	Greig, Thomas Watson, yr. of Glencarse, Perth	1861
	Grey, George A., Millfield Hill, Wooler	1854
	Grierson, James, Caigton, Castle-Douglas	1851
	Grierson, James, of Dalgoner, Dunscore	1855
	Grierson, James, Morton Mains, Thornhill	1860
1490	Grierson, John, of Muirside, Holywood	1860
	Grierson, Joseph, Breoch, Castle-Douglas	1859
	Grierson, Robert, Westmains, Dumfries	1860
	Grierson, William, Torrs, Castle-Douglas	1859
	Grieve, John, Castles, Dalmally	1858
	Grieve, Michael, Kielater, Tyndrum	1859
	Grieve, Robert, Laudle, Strontian	1857
	Grieve, Robert, Mornish, Killin	1857
	Grieve, Walter, Whitehills, Muckhart	1861
	Grieve, William, Branxholm Park, Hawick	1834
1500	Grieve, William, Skelfhill, Hawick	1854
	Grigor, James D., Wester Alves, Forres	1858
	Grigor, John, Forres Nurseries, Forres	1847
	Guild, Andrew, Coulshill, Auchterarder	1861
	Gulland, James, Newton of Wemyss, Kirkcaldy	1851
	Gulston, Allan James, Woodlands Castle, Swansea	1856
	Gunn, Alexander, Dalemore, Thurso	1850
	Gunn, Alexander, Dornoch	1856
	Gunn, James, Glendhu, Golspie	1839
	Gunn, Marcus, Culgower, Golspie	1849
1510	Gunn, William, Glendhu, Golspie	1839
	Guthrie, David, Edinburgh	1850
	Guthrie, David, Banker, Stranraer	1854
	Guthrie, George, Rephad, Stranraer	1839
	Guthrie, John, of Guthrie, Forfar	1836
	Guthrie, Robert, Crossburn, Troon	1857
	Gwynne, Alban Thos. Jones, of Monachty, Cardigan	1834

*HAMILTON and BRANDON, His Grace William, Duke of	1834
HUNTLY, The Most Noble Charles, Marquis of	1819
†HOME, The Right Hon. Cospatrick, Earl of	1843

		Admitted
1520	†Haddington, The Right Hon. George, Earl of	1841
	Hopetoun, The Right Hon. John, Earl of	1853
	Herries, The Right Hon. William, Lord	1830
	Halliburton, The Right Hon. Lord John	1844
	†Hamilton, The Right Hon. R. C. Nisbet	1825
	Hope, Sir Archibald, of Pinkie, Bart.	1832
	Hay, Sir Adam, of Smithfield and Hayston, Bart.	1825
	Hay, Sir John C. Dalrymple, of Park Place, Bart., M.P.	1848
	Hall, Sir James of Dunglass, Bart.	1849
	Hepburn, Sir Thomas Buchan, of Smeaton, Bart.	1837
1530	Hadden, Alexander, Aberdeen	1840
	Hadden, George, Coburty, Fraserburgh	1858
	Haddon, Alexander, Honeyburn, Hawick	1857
	Hadwen, Sidney, Kildonan Lodge, Golspie	1854
	Hagart, Colonel, Duke Street, Edinburgh	1862
	Hagart, Thomas, of Bantaskine, Falkirk	1826
	Haggart, James V., of Glendelvine, Edinburgh	1834
	Haig, Andrew, Meikle Kilmory, Rothesay	1855
	Haig, J. A., Stage Hall, Stow	1855
	Haig, John, Cameron House, Windygates	1841
1540	Haig, William, Kincaple, Cupar-Fife	1857
	Hain, David, Balgorno, St Andrews	1861
	Haining, John, Boghead, Mouswald	1861
	Haldane, Robert, Fernielee, Galashiels	1859
	Hall, Alexander, Straiton, Leuchars, Fife	1861
	Hall, Andrew, Braerich, Golspie	1855
	Hall, Henry, Coul, Dornoch	1846
	Hall, John, Scribercross, Golspie	1841
	Hall, Joseph, Mains of Kinblethmont, Arbroath	1858
	Hall, Colonel Thomas, of Killean, Tayinloan	1853
1550	Halley, Andrew, Millhole, The Cairnies, Perth	1861
	Hamilton, Daniel, Berthie Park, Perth	1861
	Hamilton, Hugh, of Pinmore, Girvan	1853
	Hamilton, John, Longrig, Torthorwald	1860
	Hamilton, John, of Sundrum, Coylton	1839
	Hamilton, John, of Fairholm, Larkhall	1827
	Hamilton, John, of Greenbank, Newton Mearns	1846
	Hamilton, John Buchanan, of Leny, Callander	1846
	Hamilton, John G. Carter, of Dalzell, Hamilton	1857
	Hamilton, John G., Hafton House, Dunoon	1858
1560	Hamilton, Lieutenant-Colonel Ferrier, of Cairnhill, Kilmarnock	1827

		Admitted
	Hamilton, Robert, W.S.	1842
	Hamilton, Robert William, Edinburgh	1814
	Hamilton, Walter Ferrier, yr. of Cairnhill, M.P.	1848
	Hamilton, William, Merchant, Glasgow	1823
	Hamilton, William, Gallowhill, Paisley	1857
	Hamilton, William, of Minard, Inverary	1858
	Hamilton, William C., of Craighlaw, Wigtown	1852
	Hamilton, Wm. F., Callendar, Falkirk	1859
	Handyside, William, of Cornhill, Biggar	1843
1570	Hannam, John, Kirk Deighton, Wetherby	1854
	Hannay, John, Corskie, Banff	1858
	Harden, Robert Allan, Doune Terrace, Edinburgh	1833
	Hardie, George, Australia	1851
	Hardie, Robert, Harrietfield, Kelso	1851
	Hardie, Thomas, Hill of Kinnaird, Falkirk	1858
	Hardie, William, Borrowstoun Mains, Bo'ness	1863
	Hare, Steuart Bayley, of Calderhall, Mid-Calder	1849
	Harley, Alexander, Cowhill, Dumfries	1860
	Harland, Wm. Chas., of Suttonhall, York	1852
1580	Harper, Frank, Dingwall	1853
	Harper, Robert, Edmonston Mains, Liberton	1857
	Harris, Thomas, Dalmarnoch, Dunkeld	1857
	Harrison, George, Horse Bazaar, Aberdeen	1858
	Harrop, Isaac Worthington, New Zealand	1846
	Harvey, Alexander, Auchintibber, Stewarton	1857
	Harvey, Arthur, Port Natal	1838
	Harvey, C. W., Merchant, Liverpool	1846
	Harvey, George, Whittingham Mains, Prestonkirk	1850
	Harvey, James, Pottertown, Belhelvie	1858
1590	Harvey, James H., Pitgersie, Foveran, Ellon	1854
	Harvey, John, of Tiningly Park, Yorkshire	1809
	Harvey, John Inglis, of Kinnettles, Forfar	1845
	Harvey, Robert, Distiller, Port-Dundas	1838
	Harvey, William James, of Carnousie, Turriff	1851
	Harvie, Rev. William, of Brownlee, Carluke	1852
	Hastie, Alexander, Glasgow	1843
	Hathorn, John Fletcher, of Castlewigg, Whithorn	1860
	Hay, Colonel A. S. Leith, of Rannes, C.B.	1862
	Hay, Lieut.-Col. Drummond, of Seggieden, Perth	1862
1600	Hay, Alexander, Salesman, Perth	1861
	Hay, George William, of Whiterigg, Sudbury	1841
	Hay, Captain James George, of Belton, Dunbar	1862
	Hay, James, Scrabster, Thurso	1862

		Admitted
	Hay, James, Merchant, Leith	1828
	Hay, James, jun., Little Ythsie, Tarves	1858
	Hay, James, Nether Mill of Tillyhilt, Tarves	1855
	Hay, John, of Letham Grange, Arbroath	1834
	Hay, John, Thirlestane Castle, Lauder	1859
	Hay, John Stewart, of Newton	1836
1610	Hay, Robert, Rechleirach, Ballindalloch	1852
	Hay, Samuel, Manager, Union Bank of Scotland	1846
	Hay, William, of Dunse Castle	1819
	Hay, William, of Hopes, Gifford	1835
	Hay, William, of Chapel, Drem	1853
	Hebden, Robert James, of Eday, Kirkwall	1857
	Hector, David, Sheriff of Wigtown and Kirkcudbright shires	1863
	Hector, Robert, Union Street, Montrose	1848
	Heddle, J. G., of Melsetter, Kirkwall	1863
	Heggie, Walter, Kirkcaldy	1859
1620	Henderson, Alexander, Longniddry, Tranent	1837
	Henderson, Alexander, of Stemster, Thurso	1847
	Henderson, Charles, Abbotrule, Bonchester Bridge	1854
	Henderson, Charles J., Corn Merchant, Leith	1847
	Henderson, David, of Abbotrule, Bonchester Bridge	1854
	Henderson, David, of Gattaway, Newburgh	1850
	Henderson, Duncan, M.D.	1825
	Henderson, George, East Gordon, Kelso	1854
	Henderson, George, Airdrie, Dumfries	1860
	Henderson, G. D. Clayhills, Hallyards, Perthshire	1843
1630	Henderson, James, Islay	1851
	Henderson, James, Netherraw, Lilliesleaf	1863
	Henderson, James, Auchincorth, Penicuik	1854
	Henderson, James, Kelloside, Sanquhar	1860
	Henderson, John, of Park, Glasgow	1838
	Henderson, John, W.S., Banker, Thurso	1839
	Henderson, John, Byres, Haddington	1850
	Henderson, John, Middlethird, Kelso	1854
	Henderson, John, Humbie Mains, Blackshiels	1859
	Henderson, Peter, Paisley	1859
1640	Henderson, Robert, Lornshill, Alloa	1858
	Henderson, Thomas, Chesterton, Dalkeith	1854
	Henderson, Thomas, Shidlaw, Coldstream	1863
	Henderson, William, Craigairnhall, Stirling	1851
	Henderson, William, Milton, Coupar-Angus	1861
	Hendrie, John, Kirkwood Colliery, Coatbridge	1862

		Admitted
	Hepburn, John, Keithfield, Tarves	1858
	Hepburn, John Buchan	1845
	Hepburn, John Stewart, of Colquhalzie, Auchterarder	1810
	Hepburn, William Rickart, of Rickarton, Stonehaven	1859
1650	Heriot, Frederick L. Maitland, of Ramornie, Sheriff of Forfarshire	1851
	Heron, John, Duchlege, Crieff	1861
	Herriot, James, Leetside, Whitsome, Coldstream	1863
	Herries, William Young, of Spottes, Edinburgh	1823
	Herries, Alex. Young, yr. of Spottes, Edinburgh	1853
	Hewat, Richard, Writer, Castle-Douglas	1857
	Hewetson, Robert, Auchenbenzie, Thornhill	1834
	Hewetson, James, Auchenbenzie, Thornhill	1862
	Hill, Alex., of Stonywynd, Boarhills, St Andrews,	1861
	Hill, George Gosset, Merchant, London	1823
1660	Hill, James Lawson, W.S., Edinburgh	1847
	Hill, James, Bradestane, Meigle	1861
	Hill, John, Easter Carlowrie, Cramond	1850
	Hill, Lawrence, Writer, Glasgow	1838
	Hill, Robert, Golspie Tower Farm, Golspie	1851
	Hill, Robert, Cronan, Meigle	1861
	Hilson, George, jun., Jedburgh	1863
	Hilton, Henry, of Fairgirth, Dalbeattie	1860
	Hislop, Robert, jun., Prestonpans	1854
	Hobkirk, James, Craiglockhart, Slateford	1862
1670	Hobbs, Wm. Fisher, of Boxted Lodge, Colchester	1848
	Hodgson, Richard, of Carham, M.P., Coldstream	1850
	Hog, Thomas A., of Newliston, Kirkliston	1860
	Hogarth, George, Banker, Cupar-Fife	1842
	Hogarth, George, Eccles Tofts, Greenlaw	1863
	Hogg, Robert, Rosemay, Penicuik	1859
	Hogg, Thomas, Hillhouse, Coldstream	1854
	Hogg, Thomas, Cakemuir, Ford	1858
	Home, David Milne, of Wedderburn, Coldstream	1835
	Home, Francis, Sheriff-Substitute, Linlithgow	1829
1680	Home, G. H. Binning, of Argaty, Doune	1831
	Home, Lieut.-Col. Geo. Logan, of Broomhouse, Dunse	1852
	Homeyer, Johannes, of Wranglesburg, Prussia	1862
	Honeyman, John, Ballamoar, Patrick, Isle of Man	1857
	Hood, Archibald, Coal Manager, Whitehill, Lasswade	1858
	Hood, Charles, Inverbrora, Golspie	1856
	Hood, James, Newmains, Prestonkirk	1857
	Hood, John, of Stoneridge, Coldstream	1827

		Admitted
	Hood, John, Townhead, Cockburnspath	1859
	Hood, John, Linross, Kirriemuir	1861
1690	Hood, Stewart T. M., Pitcur, Coupar-Angus	1861
	Hood, Thomas, Coldstream Mains, Coldstream	1854
	Hope, Andrew, Edinburgh	1851
	Hope, George, Fenton Barns, Drem	1848
	Hope, Geo. William, of Luffness, M.P., Drem	1848
	Hope, James, Duddingston, Portobello	1847
	Hope, James, of Belmont, W.S., Edinburgh	1848
	Hope, John, Carbrook Mains, Stirling	1857
	Hope, John Henry, South Elphinstone, Tranent	1851
	Hope, William, Edinburgh	1859
1700	Horn, James, of Pitmedden, Aberdeen	1860
	Horn, John, of Thomanean, Kinross	1847
	Horn, Robert, Advocate, Edinburgh	1851
	Horn, Robert, Burnfoot, Perth	1861
	Horne, Donald, W.S., Edinburgh	1817
	Horne, James, Civil Engineer, Edinburgh	1848
	Horne, Major James, of Stirkoke, Wick	1846
	Horne, Thomas Elliot Ogilvie, W.S., Edinburgh	1851
	Hornsby, Richard, jun., Grantham	1858
	Horrocks, John	1818
1710	Horsburgh, Robert, House of Tongue	1841
	Horsburgh, Major William Henry	1824
	Hosack, William, Dochcarty, Dingwall	1853
	Hotchkis, James, Dumfries	1838
	Houldsworth, Henry, of Coltness, Wishaw	1857
	Houldsworth, Joseph Henry, Glasgow	1857
	Houldsworth, William, Glasgow	1857
	Houston, John, Geilston, Cardross	1857
	Houston, Colonel A., of Clerkington, Haddington	1845
	Houston, William, Kintradwell, Golspie	1854
1720	Howard, James (J. and F. Howard), Bedford	1859
	Howat, Robert Kirkpatrick, of Mabie, Dumfries	1841
	Howden, Francis, Falkland	1842
	Howden, James, Jeweller, Edinburgh	1827
	Howden, Robert, Boggs, Pencaitland	1850
	Howe, Alexander, W.S., Edinburgh	1854
	Howie, John, Muirhouse, Kilmarnock	1857
	Howie, John, Maxwood, Galston	1857
	Hoyes, James, Kinneddar, Elgin	1854
	Hoyle, Duncan, of Kames, Rothesay	1855
1730	Hozier, James, of Newlands, Mauldslie Castle, Carluke	1822

		Admitted
	Hozier, William Wallace, St Enoch's, Glasgow	1862
	Hubback, Joseph, Liverpool	1853
	Hubback, Thomas, Sunlawshill, Kelso	1851
	Huggins, W. B., Glasgow	1844
	Hughan, Peter, Cults, Garlieston	1860
	Hughan, Thomas, of Airds	1838
	Huie, James, Durry, Campbeltown	1857
	Hume, M. N. Macdonald, of Ninewells, W.S., Edin.	1818
	Hume, P. Hallyburton, Lawfield, Cockburnspath	1840
1740	Hume, Thomas, Portobello	1854
	Hunt, James Alex., of Pittencrieff, Dunfermline	1849
	Hunt, James, of Navity, W.S., Edinburgh	1859
	Hunt, Thomas, Thornington, Coldstream,	1863
	Hunter, Alexander, St Colmac, Rothesay	1855
	Hunter, Alexander, Nethershiel, Ratho	1855
	Hunter, Charles, Argath, Errol	1823
	Hunter, David, of Blackness, Dundee	1826
	Hunter, Evan Allan, W.S., Edinburgh	1860
	Hunter, George M., Cuthlie, Arbroath	1861
1750	Hunter, Herbert, of Burnhead, Lockerbie	1861
	Hunter, James	1823
	Hunter, Lt.-Colonel James, of Auchterarder	1823
	Hunter, James, of Auldhouseburn, Wishaw	1852
	Hunter, James William, of Thurston, Dunbar	1842
	Hunter, John, Oxenford Mains, Ormiston	1842
	Hunter, John, New Banchory, Banchory	1857
	Hunter, Philip, Edinburgh	1856
	Hunter, Richard, Ainslie Place, Edinburgh	1837
	Hunter, Robert, Sheriff of Bute and Dumbarton	1843
1760	Hunter, Robert, Dalhousie Chesters, Lasswade	1854
	Hunter, Robert, Ainslie Place, Edinburgh	1862
	Hunter, William G., Dumfedling, Langholm	1860
	Hunter, William, Haugh, Kirkliston	1853
	Hunter, William King, Banker, Dunse	1854
	Hunter, William, Mackribeg, Campbeltown	1857
	Husband, Robert, Gellet, Dunfermline	1859
	Hutchinson, James, Merchant, Glasgow	1838
	Hutchinson, William, of Ruthven, Coldstream	1863
	Hutchison, James, Inglistone, New Abbey	1857
1770	Hutchison, John	1841
	Hutchison, Robert, of Cairngall, Longside	1829
	Hutchison, Robert, of Carnock, Kirkcaldy	1850
	Hutchison, Robert, of Carlowrie, Kirkliston	1858

		Admitted
	Hutton, Thomas, St Cyrus, Montrose	1844
	Hyndman, Henry C., of Springside, West Kilbride	1859
	Hyslop, Hamilton D. B., Tower, Sanquhar	1857
	Inglis, The Right Hon. John, Lord Justice-Clerk	1852
	Ivory, The Hon. Lord	1833
	Innes, Sir James Milne, of Edingight, Bart.	1838
1780	Imrie, William, Perth	1861
	Inch, John, West Mains, Liberton	1855
	Inglis, Charles Craigie Halkett, of Cramond	1834
	Inglis, Harry Maxwell, of Logan Bank, P.C.S.	1847
	Inglis, Henry, of Torsonce, W.S., Edinburgh	1849
	Inglis, Lieut.-Col. Hugh, of Kingsmills, Inverness	1856
	Inglis, John, Steam Mills, Musselburgh	1860
	Inglis, John, of Redhall, Slateford	1857
	Inglis, William, Rosebery, Gorebridge	1858
	Inkson, Patrick, Berryleys, Keith	1857
1790	Innes, Alexander, of Cowie, Stonehaven	1840
	Innes, Alexander Mitchell, of Ayton	1842
	Innes, Cosmo, P.C.S., Edinburgh	1840
	Innes, George Mitchell, of Bangour, Uphall	1847
	Innes, John B., W.S., Edinburgh	1847
	Innes, Thomas, of Learney, Torphins	1846
	Innes, Thomas Mitchell, of Phantassie, Prestonkirk	1842
	Innes, Thomas G. Rose, of Netherdale, Turriff	1862
	Innes, William, of Raemoir, Banchory	1834
	Ironside, John, Brindy, Whitehouse, Aberdeen	1858
1800	Ironside, William, Clofrickford, Ellon	1859
	Irvine, Alexander Forbes, of Drum, Edinburgh	1845
	Irvine, Rev. A. Robertson, D.D., Blair-Atholl	1838
	Irvine, John, Carco, Kirkconnel	1860
	Irvine, William Stewart, M.D., Pitlochrie	1843
	Irving, George Vere, of Newton, Abington	1844
	Irving, John, London	1838
	Irving, William, Barndennoch, Auldgirth, Dumfries	1857
	Jerviswoode, The Hon. Lord	1831
	Johnstone, The Hon. Henry Butler, of Corehead	1842
1810	Jardine, Sir William, of Applegarth, Bart.	1823

		Admitted
	JOHNSTONE, Vice-Admiral Sir Wm. J. Hope, K.C.B.	1859
	JOHNSTON, Sir William, of Kirkhill, Edinburgh	1848
	Jack, Adam	1859
	Jack, David	1858
	Jack, Michael, Peggy's Mill, Cramond	1863
	Jack, Samuel, Dreghorn Mains, Colinton	1860
	Jack, Robert, West Craigs, Corstorphine	1854
	Jack, Robert, West Nemphlar, Lanark	1855
	Jackson, Edward, Coates Crescent, Edinburgh	1863
1820	Jackson, John, of Amisfield, Dumfries	1859
	Jackson, John, Bush, Langholm	1859
	Jaffray, John, Bank Agent, Dunbar	1858
	Jameson, Melville, Solicitor, Perth	1852
	Jamieson, David, Mains of Auchmithie, Arbroath	1858
	Jamieson, George Auldjo, Accountant, Edinburgh	1860
	Jamieson, James Fife, Glasgow	1857
	Jamieson, John, of Kingask, St Andrews	1860
	Jamieson, Richard, Holm, Carsphairn	1861
	Jamieson, William, Comlongan Castle, Annan	1860
1830	Jamieson, William H., Straiton, Liberton	1858
	Jamieson, Wm. Alexander, Colliston Mains, Arbroath,	1858
	Jardine, Andrew, of Lanrick, Doune	1846
	Jardine, Alexander, yr. of Applegarth, Lockerbie	1850
	Jardine, James, of Larriston, Dryfeholm, Lockerbie	1846
	Jardine, John, of Thorlieshope, New Castleton	1854
	Jardine, Robert, of Balgray, Lockerbie	1860
	Jeffrey, John, Glasgow	1857
	Jeffrey, John, of Balsusney, Kirkcaldy	1859
	Jeffray, William Allan, Braehead, Dalswinton	1862
1840	Jobson, William, Turvelaws, Wooler	1855
	Johnson, George, Springfield, Forres	1857
	Johnston, Alexander, W.S., Blackhall, Edinburgh	1836
	Johnston, Alexander, Hailes, Slateford	1852
	Johnston, George, Redburn, Irvine	1822
	Johnston, George, Marlefield, Kelso	1853
	Johnston, Henry, 32 Heriot Row, Edinburgh	1863
	Johnston, James, Capplegill, Moffat	1854
	Johnston, James, Letham Mains, Haddington	1856
	Johnston, James, Huntington, Lauder	1857
1850	Johnston, John	1833
	Johnston, John, jun., Ballencrieff Mains, Bathgate	1856
	Johnston, John, Mill of Hirn, Banchory	1857
	Johnston, John S., Crailinghall, Jedburgh	1853

		Admitted
	Johnston, Robert, Merchant, Aberdeen	1839
	Johnston, Major-Gen., of Carnsalloch, Dumfries	1860
	Johnston, William, of Lathrisk, Falkland	1849
	Johnston, William, Writer, Bathgate	1852
	Johnston, William, Ranachan, Campbeltown	1857
	Johnstone, Alexander, W.S.	1819
1860	Johnston, Charles, Mingary, Strontian	1857
	Johnstone, Christopher, Townfoot, Dumfriesshire	1850
	Johnstone, George, M.D., Fincraigs, Cupar	1857
	Johnstone, James, Banker, Dumfries	1860
	Johnstone, James, of Alva, Stirling	1828
	Johnstone, James Bell, Holestane, Thornhill	1860
	Johnstone, John A., Archbank, Moffat	1859
	Johnstone, John James Hope, of Annandale, M.P.	1824
	Johnstone, Robert, Polmoodie, Moffat	1859
	Johnstone, Thomas, Lochhouse, Moffat	1859
1870	Johnstone, Walter, Archbank, Moffat	1859
	Jolly, David Leitch, Banker, Perth	1829
	Jolly, William Gairdner, Catter, Drymen	1845
	Jones, Charles Digby	1862
	Jopp, Alexander, Advocate, Aberdeen	1834
	Jopp, Robert, New Zealand	1858

	†KINNOULL, The Right Hon. Thomas, Earl of	1806
	KINTORE, The Right Hon. Francis, Earl of	1850
	†KINNAIRD, The Right Hon. George Wm., Lord, K.T.	1830
	KINNAIRD, The Hon. Arthur, M.P.	1862
1880	KENNEDY, The Right Hon. T. F., of Dunure	1812
	KINLOCH, The Hon. Lord	1844
	KINLOCH, Sir David, of Gilmerton, Bart.	1828
	Kay, Charles, Earnside, Forres	1858
	Kay, John, Softlaw, Kelso	1863
	Kaye, Robert, of Millbrae, Moodiesburn	1844
	Keir, Andrew T., Noss, Wick	1844
	Keir, Patrick Small, of Kinmonth, Kirkmichael	1837
	Keir, Simon, Ceylon	1857
	Keir, William, of Whitehaugh, Castleton, Canobie	1859
1890	Kemp, James, Balnaglack, Petty, Inverness	1857
	Kemp, John, Implement Maker, Stirling	1852
	Kemp, John A., yr. of Hallydown, Musselburgh	1857
	Kemp, Robert, Grain-Merchant, Aberdeen	1858

		Admitted
	Kennedy, Donald, Monteagle, Tain	1838
	Kennedy, Capt. Hew Fergusone, of Finnart, Girvan	1832
	Kennedy, James, Brandleys, Sanquhar	1859
	Kennedy, James, New Zealand	1850
	Kennedy, John, of Kirkland, Tynron, Dumfries	1839
	Kennedy, John Lawson, of Knocknaling, Dalry	1846
1900	Kennedy, Primrose William, of Drummellan, Ayr	1842
	Kennedy, Robert, Ballechin, Dunkeld	1861
	Kennedy, T., Nursery and Seedsman, Dumfries	1845
	Kennedy, William, Kilkenzie, Maybole	1842
	Kennedy, William, W.S., Edinburgh	1862
	Kennoway, Robert, Burnhead, Lasswade	1860
	Ker, E. Martin, of Gateshaw, Morebattle, Kelso	1863
	Ker, Robert, of Auchinraith, Hamilton	1854
	Kerr, Alexander, of Scroggiehill, Castle-Douglas	1858
	Kerr, Christopher, of Arthurstone, Dundee	1843
1910	Kerr, Christopher Webster, The Cottage, Dundee	1859
	Kerr, John, Land-Surveyor, Dunse	1853
	Kerr, John, Morton, Mid-Calder	1859
	Kerr, John, Bluntfield, Mouswald, Dumfries	1860
	Kerr, Robert, of Chapeldonan, Edinburgh	1857
	Kerr, Thomas, Whitehill, Sanquhar	1860
	Kerr, William Williamson	1845
	Kerr, William, Wester Causewayend, Mid-Calder	1854
	Kerr, William Scott, of Chatto, Kelso	1833
	Kidd, Alexander, West Balmirmer, Carnoustie	1858
1920	Kidd, James, Grange of Barry, Carnoustie	1858
	Kidd, John, Midscryne, Carnoustie	1858
	Kidston, Archibald G., Glasgow	1844
	Kidston, John P., Newton House, Cambuslang	1850
	Kilgour, Robert, jun.	1826
	Kilpatrick, Peter, The Cairnies, Perth	1862
	King, James, yr. of Campsie, Levernholme, Hurlet	1857
	King, Jas. Foster, of Carnegie Park, Port-Glasgow	1850
	King, John, Braco, Airdrie	1857
	King, John H., of the Lodge, Balerno	1860
1930	King, William, Manufacturer, Glasgow	1839
	Kininmonth, Peter, Perceval, Buckhaven	1859
	Kinloch, Alex., yr. of Gilmerton, Drem	1859
	Kinloch, Alexander John, of Park, Aberdeen	1841
	Kinloch, George, of Kinloch, Meigle	1825
	Kinloch, Colonel John, of Kilrie, Kirriemuir	1829
	Kinnear, Charles, of Kinloch, Ladybank	1824

		Admitted
	Kirk, John, W.S., Edinburgh	1848
	Kirk, James, Kaimknow, Muckart	1861
	Kirkaldy, George D. H., of Hearensbrook, Ireland	1844
1940	Kirkpatrick, Robert, Challoch House, Stranraer	1857
	Kirkpatrick, Samuel, West Roucan, Torthorwald	1860
	Kirkwood, Hugh, Killermont, Maryhill, Glasgow	1854
	Kirkwood, John, Implement-Maker, Tranent	1854
	Kirkwood, Robert, High Longmuir, Kilmaurs	1852
	Knight, Robert, Middleton, Fintray	1858
	Knowles, Thomas, Flesher, Aberdeen	1858
	Kyle, Colonel Alexander, of Binghill, Aberdeen	1835
	LEINSTER, His Grace Augustus, Duke of, K.P., Honorary Member	1841
	†LOTHIAN, The Most Noble William, Marquis of	1854
1950	LAUDERDALE, The Right Hon. Anthony, Earl of, G.C.B.	1831
	LOUGHBOROUGH, The Right Hon. Francis, Lord	1857
	†LOVAT, The Right Hon. Thomas, Lord	1820
	LESLIE, The Hon. George Waldegrave	1862
	LOVAT, The Hon. Simon Fraser, Master of	1853
	LAUDER, Sir John Dick, of Fountainhall, Bart.	1848
	LOW, General Sir John, of Clatto, K.C.B.	1861
	Laing, George, Cornhill, Coldstream	1863
	Laing, John, Glendeuglie, Damhead, Kinross	1856
	Laing, Robert, Addinstone, Lauder	1850
1960	Laing, Thomas, Yorkston, Gorebridge	1855
	Laird, David, Belmont Castle, Meigle	1833
	Laird, George W., Denfield, Arbroath	1858
	Lamont, Archibald James, of Lamont, Greenock	1840
	Lamont, James, of Knockdow, Innellan	1850
	L'Amy, John R., of Dunkenny, Forfar	1854
	Landale, Andrew, Easthall, Cupar-Fife	1855
	Landale, Andrew, Balmbriech, Newburgh	1861
	Landale, James, Woodmill, Falkland	1857
	Landale, Thomas, Easter Rhynd, Perth	1855
1970	Lang, Hugh M., of Blackdales, Largs	1849
	Lang, John, Selkirk	1859
	Lang, Robert, Torr Hall, Bridge of Weir	1857
	Lang, William, of Groatholm, Kilwinning	1854
	Langdale, S., Newcastle-on-Tyne	1860
	Langlands, James C., Bewick, Alnwick	1854
	Latham, Patrick R., Aberchalder, Fort Augustus	1857
	Lauder, Dewar, Kinkell, St Andrews	1859

		Admitted
	Lauder, John Thomas, Edinburgh	1860
	Laurence, George W., Largnean, Haugh of Urr	1860
1980	Laurie, James, Mitchelston, Stow	1859
	Laurie, John, of Maxwellton, Moniaive	1840
	Laurie, Wm. Kennedy, of Woodhall, Castle-Douglas	1848
	Law, Robert, Engineer, Shettleston, Glasgow	1838
	Lawrie, William, Ferneyflat, Slateford	1850
	Lawson, Alexander, of Burnturk, Kettle	1853
	Lawson, Alexander, Merchant, Dundee	1843
	Lawson, Alexander, Old Mills, Elgin	1854
	Lawson, Charles, of Borthwick Hall, Lord Provost of Edinburgh	1830
	Lawson, Charles, junior, Edinburgh	1846
1990	Lawson, Henry Graham, Edinburgh	1859
	Lawson, Thomas, Carlarach, Innellan	1854
	Lawson, William, Lessendrum, Huntly	1853
	Leadbetter, John, Merchant, Glasgow	1838
	Learmonth, Alexander, North Bank, Bo'ness	1858
	Learmonth, Lieut.-Col. Alexander, of Dean	1860
	Learmonth, Thomas	1824
	Leckie, James, Glasgow	1857
	Lee, John, Oakwood, Selkirk	1863
	Lees, John, Marvingston, Haddington	1855
2000	Lees, Robert, of Fens, Leabrac, Galashiels	1861
	Leigh, Rev. Peter, Golborne Park, Lancashire	1823
	Leighton, James, Baldarroch, Banchory	1857
	Leitch, Archd. K., Inchstelly, Forres	1858
	Leith, Alexander, of Freefield, Old Rayne	1841
	Lennie, John, Long Newton, Gifford	1857
	Leny, James Macalpine, of Dalswinton, Dumfries	1824
	Leslie, Colonel, of Balquhain, K.H., Keith Hall	1858
	Leslie, Charles S., yr. of Balquhain, Keith Hall	1858
	Leslie, George A. Young, of Kininvie, Mortlach	1840
2010	Leslie, James, Thorn, Blairgowrie	1857
	Leslie, James, Boghall, Linlithgow	1863
	Leslie, William, of Warthill, M.P., Old Rayne	1848
	Lewis, James, George Square, Edinburgh	1863
	Liddell, James, Auchtertool House, Kirkcaldy	1843
	Ligertwood, John, Sheriff-Clerk, Aberdeen	1858
	Ligertwood, Lewis, Bracklay, Methlic	1858
	Lindsay, Alexander, Covington Mill, Biggar	1857
	Lindsay, Alexander K., of Balmungo, St Andrews	1841
	Lindsay, Donald, Accountant, Edinburgh	1843
2020	Lindsay, Ebenezer, Hartside, Lamington	1857

		Admitted
	Lindsay, James, Kilchinbuach, Campbeltown	1857
	Lindsay, James, Seton of Usan, Montrose	1858
	Lindsay, John Mackenzie, Corn-Merchant, Dundee	1826
	Lindsay, John Mackenzie, W.S., Edinburgh	1846
	Lindsay, Thomas, Hillhouse, Lamington	1857
	Lindsay, William, Solicitor, Leith	1854
	Lindsay, William, Stanhope, Stobo, Peebles	1855
	Lithgow, Edward, Bedshiel, Greenlaw, Dunse	1863
	Lithgow, William, Stanmore House, Lanark	1857
2030	Little, John, Meikleholmside, Moffat	1859
	Loch, George, London	1853
	Lochhead, Thomas, junior, Toward, Dunoon	1861
	Lockhart, Alexander Macdonald, London	1835
	Lockhart, Allan Eliott, of Borthwickbrae, Hawick	1832
	Lockhart, James Sinclair, of Castlehill	1846
	Lockhart, John, Dunmore Park, Stirling	1849
	Lockhart, Rev. Laurence, D.D., of Milton-Lockhart	1857
	Lockie, William, West Morriston, Earlston	1859
	Logan, Alexander, London	1831
2040	Logan, Alexander, Boon, Lauder	1857
	Logan, Andrew, Crossflat, Kilbarchan	1857
	Logan, David, Auchincraw, Ayton,	1854
	Logan, Edmond, W.S., Edinburgh	1855
	Logan, Thomas, Woodend, Dunse	1854
	Longmore, Andrew, Rettie, Banff	1852
	Longmore, John Alexander, W.S., Edinburgh	1837
	Longmore, William, Banker, Keith	1858
	Lorimer, George, Mayfield Terrace, Edinburgh	1857
	Lorimer, George B., Kirkland, Sanquhar	1857
2050	Lorimer, Thomas Webster, Belkie, Aberruthven	1843
	Lorimer, William, Rigg, Kirkconnell,	1860
	Lovie, Alexander, Nether Boyndlie, Fraserburgh	1857
	Low, James, Berrywell, Dunse	1843
	Low, James, Yonderton, Ellon	1854
	Low, Lieut.-Col. Robert, of Laws, Mayfield, Trinity	1841
	Lowe, Robert, General Agent, Kirkside, Perth	1861
	Lowden, John Muir, of Cocklick, Dalbeattie	1858
	Lowndes, James, of Arthurlee	1850
	Luke, John, of Brownhills, Muircambus, Colinsburgh	1859
2060	Lumsdaine, Rev. Edwin, Sandys, of Blanerne	1837
	Lumsdaine, Stamford R., of Lathallan, Colinsburgh	1862
	Lumsden, David, Pitcairnfield, Perth	1861
	Lumsden, George, Leslie Lodge, Keith Hall	1850
	Lumsden, George, Glasgow	1857

		Admitted
	Lumsden, James, Braco, Keith	1840
	Lumsden, James, Glasgow	1844
	Lumsden, John, Learmonth, Coldstream	1854
	Lumsden, Colonel Thomas, of Belhelvie, C.B.	1851
	Lumsden, William James, of Balmedie, Belhelvie	1841
2070	Lyall, Charles, Old Montrose, Montrose	1850
	Lyall, David, of Gallery, Montrose	1854
	Lyall, Robert, Carcary, Brechin	1850
	Lyall, Robert, Merchant, Glasgow	1843
	Lyall, Robert, Broombarns, Forgandenny	1861
	Lyell, John, M.D., Newburgh	1859
	Lyell, John, Banker, Newburgh	1861
	Lyell, Thomas, Shielhill, Kirriemuir	1836
	Lyon, George, of Glenogil, Finhaven	1809
	Lyon, James, Burnhaugh, Netherley, Stonehaven	1859
2080	*Montrose, His Grace James, Duke of, K.T.	1821
	Morton, The Right Hon. Sholto, Earl of	1846
	Moray, The Right Hon. John, Earl of	1824
	†Mansfield, The Right Hon. David, Earl of, K.T.	1833
	Melville, Lieut.-General, The Right Hon. Henry, Viscount, K.C.B.	1856
	Macdonald, The Right Hon. Godfrey, Lord	1833
	Mackenzie, The Right Hon. Holt	1833
	M'Neill, The Right Hon. Duncan, of Colonsay, Lord Justice-General	1833
	M'Neill, The Right Hon. Sir John, G.C.B.	1846
	Maxwell, The Hon. Marmaduke C., of Terregles	1830
2090	Maxwell, The Hon. Henry Constable, of Milnehead	1838
	Menzies, The Hon. Lady, of Menzies	1839
	Mackenzie, The Hon. Lord	1851
	Mansel, Sir John, Bart.	1840
	Maxwell, Sir W. A., of Calderwood, Bart.	1830
	Menzies, Sir Robert, of Menzies, Bart.	1841
	Murray, Sir Patrick Keith, of Ochtertyre, Bart.	1862
	Mackenzie, Sir William, of Coul, Bart.	1857
	Maxwell, Sir William, of Monreith, Bart.	1840
	Maxwell, Sir John, of Polloc, Bart.	1825
2100	Maxwell, Sir John Heron, of Springkell, Bart.	1839
	Moncreiffe, Sir Thomas, of Moncreiffe, Bart.	1843
	Mackenzie, Sir Kenneth Smith, of Gairloch, Bart.	1854
	Mackenzie, Sir Jas. J. Randoll, of Scatwell, Bart.	1838
	Mackenzie, The Rt. Hon. Lady Anne, of Scatwell	1841
	Montgomery, Sir Graham G., of Stanhope, Bart., M.P.	1843

		Admitted
	MAXWELL, Sir William, of Cardoness, Bart.	1841
	MACKENZIE, Sir Alexander Muir, of Delvine, Bart.	1862
	MARJORIBANKS, Sir John, of Lees, Bart.	1854
	MAITLAND, Sir Alex. C. Gibson, of Cliftonhill, Bart.	1847
2110	MACKENZIE, Sir Evan, of Kilcoy, Bart.	1846
	MENTETH, Sir James Stuart, of Mansfield, Bart.	1857
	MACTAGGART, Sir John, of Ardwell, Bart.	1839
	MATHESON, Sir James, of Lews, Bart., M.P.	1843
	MACDONALD, Gen. Sir John, of Dalchosnie, K.C.B.	1819
	MACDOUGALL, Admiral Sir John, of Macdougal, K.C.B., Oban	1821
	Macadam, John, Blairover, Drymen	1857
	Macadam, Dr Stevenson, F.R.S.E., Edinburgh	1859
	Macalister, Alexander, of Loup and Torrisdale	1840
	Macalister, Keith, of Glenbarr, Tarbert	1842
2120	M'Alister, Robert, Mid Ascog, Rothesay	1855
	Macallan, James, W.S., Edinburgh	1823
	M'Arthur, John, Banker, Inverary	1862
	Macarthur, Major Alexander	1840
	Macarthur, Duncan, New Zealand	1842
	Macarthur, Dr Peter, Australia	1819
	M'Artney, James, Royal Hotel, Muckhart	1857
	Macaskill, Donald, of Rhudunan, Broadford	1840
	Macaskill, Hugh, Rhudunan, Broadford	1830
	M'Auslin, J., Kilbridbeg, Cairndow	1853
2130	MacAndrew, D. M., Merchant, Leith	1854
	MacBey, Peter, Land-Surveyor, Woodside, Elgin	1854
	Macbraire, James, of Broadmeadows, Berwick	1863
	M'Call, Henry, younger of Daldowie, Glasgow	1846
	M'Call, James, of Daldowie, Glasgow	1844
	M'Call, Samuel, of Caitloch, Minniehive	1847
	M'Call, Thomas, Merchant, Glasgow	1838
	M'Callum, George Kellie, of Braco, Perthshire	1842
	M'Callum, John, Plewlands, Edinburgh	1843
	M'Callum, John, Hosh Distillery, Crieff	1861
2140	M'Candlish, John M'Gregor, W.S., Edinburgh	1859
	M'Caw, Alexander, Ardlochan, Kirkoswald	1851
	M'Chlery, Henry, London	1857
	M'Clean, Alexander H., Auchneel, Stranraer	1851
	MacClelland, George, W.S.	1838
	M'Coll, Donald, Appin House, Appin	1843
	M'Combie, James Boyn, Advocate, Aberdeen	1840
	M'Combie, John, Kinaldie, Tarland	1858
	M'Combie, Peter, Farmtown of Linturk, Alford	1858

		Admitted
	M'Combie, Robert, Mains of Drumtochty, Auchinblae	1858
2150	M'Combie, William, of Easter Skene, Skene	1840
	M'Combie, William, Tillyfour, Aberdeen	1847
	M'Conachy, Archibald, Mackremore, Campbeltown	1857
	M'Connach, Charles, Hopwell, Tarland	1858
	.M'Connel, John, Penrith	1842
	M'Conochie, John, Penninghame, Newton-Stewart	1851
	M'Cowan, Robert, Sec. Glasgow Agricul. Society	1856
	M'Craken, John, Drum, New Abbey, Dumfries	1850
	M'Crie, James, Broughton Mains, Garlieston	1860
	M'Culloch, Alexander, of Glen, Gatehouse of Fleet	1859
2160	M'Culloch, David, Stranraer	1852
	M'Culloch, Edward, Foreside, Dumfries	1860
	M'Culloch, Walter, of Ardwall, Gatehouse of Fleet	1849
	Macdiarmid, Charles A., Acharn, Killin	1858
	M'Diarmid, D. A., Killiemore, Aros	1858
	Macdonald, Alexander, of Lochshiel, Strontian	1824
	Macdonald, Dr Alexander, Prince Edward's Island	1838
	Macdonald, Alexander, Inverness	1841
	Macdonald, Alexander, Balranald, Lochmaddy	1854
	Macdonald, Alexander, jun., Strathmashie, Kingussie	1857
2170	Macdonald, Alexander, Runnagour, Aberfoyle	1857
	Macdonald, Alexander S., Mudale, Lairg	1855
	Macdonald, Alister M'Ian, yr. of Dalchosnie, Pitlochry	1841
	Macdonald, Angus, Banker, Callander	1857
	Macdonald, Angus, of Glenaladale, Fort-William	1827
	Macdonald, Archibald Burns, of Glencoe, Perth	1855
	Macdonald, Archibald, Islay	1838
	Macdonald, Major Donald, of Ardmore	1822
	Macdonald, Captain Donald, of Isauld, Thurso	1817
	Macdonald, Donald, Bridge End, Dingwall	1850
2180	Macdonald, Donald, Weem Inn, Aberfeldy	1860
	Macdonald, Duncan C., Dunkeld	1859
	Macdonald, Harry, Banker, Portree	1857
	Macdonald, Hugh P.	1830
	Macdonald, James T., Balranald, Lochmaddy	1832
	Macdonald, John, Procurator-Fiscal, Dunfermline	1836
	Macdonald, John, of Monachyle, Lochearnhead	1857
	Macdonald, John Robertson, Rodil, Harris	1841
	Macdonald, Peter, Brodick, Arran	1861
	Macdonald, Reginald George, of Clanranald	1807
2190	Macdonald, Roderick C., of Castle Teirim	1839
	Macdonald, Lt.-Col. William, of Powderhall, Edin.	1813
	Macdonald, Professor William, M.D., St Andrews	1818

		Admitted
	Macdonald, William, Glasgow	1844
	Macdonald, William S., Fairyknowe, Ecclefechan	1860
	Macdonald, William, of Balnakilly, Blairgowrie	1861
	Macdonald, Wm. Macdonald, of St Martin's, Perth	1844
	Macdonell, Æneas Ronald, of Morar, Edinburgh	1846
	Macdouall, Colonel James, of Logan, Stranraer	1838
	M'Dougal, Thomas, Eskmills, Penicuik	1856
2200	Macdougal, Alexander, Granton Mains, Edinburgh	1847
	Macdougall, Allan, W.S.	1829
	M'Dougall, Arch., Miltown, Ardtalanaig, Kenmore	1860
	M'Dougall, Duncan D., Ardbeg, Islay	1862
	Macdougall, Colin, of Lunga	1808
	Macdougall, Captain James Patrick	1838
	Macdougall, John, Kerrytonlia, Rothesay	1853
	MacDougall, Dugald, of Gallanach, Oban	1814
	MacDougall, Patrick, yr. of Gallanach, W.S. Edin.	1849
	M'Dowall, Major-Gen., of Garthland, Lochwinnoch	1846
2210	Macdowall, Henry, Carruth, Renfrewshire	1845
	Macduff, Alexander, of Bonhard, Perth	1843
	Macduff, Capt. Alexander, Blair-Athole	1839
	M'Duff, James, Newmill, Stanley	1859
	Macewan, James, of Tar of Ruskie, Callander	1834
	M'Ewan, Alexander	1846
	M'Ewan, Andrew, South Glen, Dalbeattie	1858
	M'Ewan, John, Merchant, Inverness	1839
	M'Ewan, John, Merchant, Glasgow	1850
	M'Ewan, William Alexander, of Sunderland, Islay	1859
2220	MacEwen, Neil M., Blackdub, Stirling	1859
	Macfarlan, William, of Bencloich, Callander	1832
	Macfarlane, Alexander, of Thornhill, Falkirk	1825
	Macfarlane, Archd., Clachan, Cairndow	1857
	Macfarlane, Donald, Auchray, Aberfoyle	1857
	Macfarlane, Donald, Balmuldy, Bishopbriggs	1860
	Macfarlane, Duncan, Torr, Row	1857
	Macfarlane, James, Shielhill, Stanley	1861
	Macfarlane, John, of Muckroy	1821
	Macfarlane, John, of Ballencleroch, Lennoxtown	1857
2230	Macfarlane, John, Greenfield, Helensburgh	1857
	Macfarlane, Thomas, Clachan, Cairndow	1829
	Macfarlane, Alex., Pollanilline, Campbeltown	1857
	M'Farlane, John, Faslane, Helensburgh	1851
	Macfie, Claud, of Gogarburn, Corstorphine	1862
	Macfie, John, Borland of Southwick, Dumfries	1860
	Macfie, Samuel, Borland of Southwick, Dumfries	1860

		Admitted
	M'Gibbon, David, Inveravon, Polmont	1863
	M'Gill, James, Torrorie, Kirkbean, Dumfries	1850
	M'Gill, James, Rotchell, Dumfries	1860
2240	M'Gill, John, Barsalloch, Wigtown	1850
	M'Gowan, Thomas H., Writer, Dumfries	1860
	Macgregor, Alexander, London	1837
	Macgregor, Donald Robert, Merchant, Leith	1857
	Macgregor, James, Fort-William	1833
	Macgregor, John, late of Glengyle	1832
	M'Gregor, James, of Glengyle	1857
	M'Gregor, John, Bellridding, Dumfries	1859
	M'Gregor, John, Tynreich, Dunkeld	1861
	Macgregor, Ronald, W.S., Fort-William	1858
2250	M'Ilraith, James, of Auchenflower, Ballantrae	1835
	Macinroy, James Patrick, of Lude, Blair-Athole	1831
	Macinroy, Lieut.-Colonel Wm., of The Burn, Brechin	1827
	Mackintosh, Lieut.-General, of Campsie, K.H.	1852
	M'Intyre, Archibald, Dunalunt, Rothesay	1855
	MacIntyre, Donald, Tenablair, Comrie	1861
	Macintyre, John, Cleugh Farm, Oban	1844
	M'Isaac, John, Corraphlin, Campbeltown	1857
	M'Iver, Evander, Scourie	1850
	Macivor, John, New South Wales	1827
2260	Mack, James, Upper-Keith, Blackshiels	1851
	Mack, William, of Berrybank, Reston	1854
	Mackay, Charles, Jeweller, Edinburgh	1839
	Mackay, Donald, Lythmore, Thurso	1852
	Mackay, George, of Bighouse	1846
	Mackay, James, Edin., Silversmith to the Society	1804
	Mackay, John, Soccoth, Dalmally	1857
	Mackay, John Alexander, of Blackcastle, Edinburgh	1857
	Mackay, Thomas, Shiness, Lairg	1856
	Mackay, Thomas George, W.S., Edinburgh	1837
2270	M'Kean, Robert, Lumloch, Bishopbriggs	1857
	M'Kechnie, Neil, Inverary	1855
	Mackellar, Duncan	1839
	McKellar, Neill, Kilmartin, Lochgilphead	1862
	Mackenzie, Alex., Alanfearn, Culloden, Inverness	1853
	Mackenzie, Alexander, Edinburgh	1846
	Mackenzie, Captain Boyce, Creech, Bonar	1855
	Mackenzie, Daniel, jun., Merchant, Glasgow	1844
	Mackenzie, Donald, Sheriff of Fifeshire	1848
	Mackenzie, Donald, Balnabeen, Dingwall	1855
2280	Mackenzie, Donald, Balguie, Applecross	1858

		Admitted
	Mackenzie, George, Dingwall	1830
	Mackenzie, George A., Merchant, Liverpool	1862
	Mackenzie, Hugh, of Dundonnell, Ullapool	1860
	Mackenzie, James, W.S., Edinburgh	1845
	Mackenzie, John, of Glack, Old Meldrum	1835
	Mackenzie, John, Bank of Scotland, Edinburgh	1848
	Mackenzie, John, Barnhill, Dumfries	1850
	Mackenzie, John Monro, Wishaw	1853
	Mackenzie, John Ord, of Dolphinton, W.S., Edinburgh	1848
2290	Mackenzie, John Whitefoord, W S., Edinburgh	1821
	Mackenzie, John, jun., W.S., Edinburgh	1863
	Mackenzie, Keith William Stewart, of Seaforth	1846
	Mackenzie, Kenneth, Accountant, Auditor of Accounts to the Society	1848
	Mackenzie, Kenneth Francis	1811
	Mackenzie, Kenneth John, Advocate	1845
	Mackenzie, Murdo, Easter Moy, Beauly	1853
	Mackenzie, Robert D, of Caldarvan, Alexandria	1838
	Mackenzie, Roderick, Glack, Aberdeen	1856
	Mackenzie, Thomas, of Ord, Beauly	1846
2300	Mackenzie, Dr William, of Culbo, Edinburgh	1810
	Mackenzie, Wm., Carron, Ballindalloch	1857
	Mackenzie, Wm., yr., Unthank, Inchture	1852
	Mackenzie, William, Ardross, Dingwall	1862
	M'Kerchar, James, Dalchiarlich, Fortingal	1860
	M'Kerral, Archd., Brunerican, Campbeltown	1857
	Mackerrow, Andrew, Beansburn, Kilmarnock	1862
	M'Kessack, John, Balnaferry, Forres	1857
	Mackie, George, of Dunjarg, Castle-Douglas	1860
	Mackie, Ivie, of Auchencairns, Castle-Douglas	1862
2310	Mackie, James, of Bargaly, M.P., Castle-Douglas	1845
	Mackie, John, Sarkshields, Kirkpatrick-Fleming	1860
	Mackie, John, Oldtown of Coynach, Mintlaw	1853
	Mackie, John Wyse, Princes Street, Edinburgh	1852
	Mackie, Robert, Factor, Loudon, Galston	1857
	Mackie, Thomas, Sauchope, Crail	1861
	Mackinlay, David, Oswald Bank, Partick	1844
	Mackinlay, David, of Newlandburn, Edinburgh	1848
	Mackinlay, James, Glasgow	1854
	Mackinlay, John, Whitehaven	1818
2320	M'Kinnell, Andrew, Clouden, Dumfries	1860
	Mackinnell, J. B. A., yr. of M'Murdieston, Dumfries	1860
	Mackinnon, Alexander Kenneth, Corry, Broadford	1827

		Admitted
	Mackinnon, Neil, of Demerara	1829
	Mackinnon, William Alexander, of Mackinnon, M.P.	1811
	Mackintosh, Æneas, of Daviot, Inverness	1839
	Mackintosh, Æneas, of Balnespeck, Inverness	1846
	Mackintosh, Æneas W., of Raigmore, Inverness	1844
	Mackintosh, Lieut.-Col. Alexander, of Far, Inverness	1839
	Mackintosh, Alexander, Greenside St., Edinburgh	1856
2330	Mackintosh, Angus, of Holm, Inverness	1844
	Mackintosh, George, of Geddes, Nairn	1832
	Mackintosh, George Gordon, Balnespick, Inverness	1846
	Mackintosh, James, of La Mancha, Leadburn	1851
	Mackintosh, Robert T., Seedsman, Edinburgh	1854
	Mackintosh, William, Australia	1813
	M'Kirdy, John Gregory, of Birkwood, Lesmahagow	1850
	M'Knight, Alexander	1860
	Maclachlan, Alexander, Easter Longhaugh, Paisley	1850
	Maclachlan, George, W.S., Edinburgh	1843
2340	Maclachlan, Hugh, Accountant, Glasgow	1858
	Maclachlan, Robert, of Maclachlan	1817
	Maclachlan, W. A., Auchentraig, Balfron	1862
	Maclagan, Douglas, M.D., Professor of Medical Jurisprudence, University of Edinburgh	1853
	Maclagan, Peter, Haddo House, Methlic	1847
	Maclagan, Peter, of Pumpherston, Mid-Calder	1847
	Maclaine, Donald, of Lochbuy, Mull	1855
	Maclaine, Hugh, of Killundine, Morvern	1847
	Maclanachan, James, Van Dieman's Land	1855
	Maclaren, Charles, Moreland Cottage, Edinburgh	1833
2350	Maclaren, Donald, Corrychrone, Callander	1859
	Maclaren, Duncan, Cambusericht, Callander	1834
	Maclaren, Duncan, Newington House, Edinburgh	1853
	Maclaren, D. S., Banker, Fort-William	1858
	Maclaren, Dr John, of Balemenoch, Blairgowrie	1839
	M'Laren, James, Carnalarick, Ballater	1859
	M'Laren, John, Monzie, Blair-Athole	1859
	M'Laren, John, Millhill, Inchture	1858
	M'Laren, John, Muirpersie, Kirriemuir	1859
	M'Laren, Joseph, Muirpersie, Kirriemuir	1859
2360	Maclaren, William, Glasgow	1850
	M'Laurin, James, Greenhill, Dalbeattie	1858
	M'Lay, William, V.S., Blairgowrie,	1862
	M'Lean, Alexander, Ballmaglen, Campbeltown	1857
	Maclean, Alexander, of Ardgour, Bonaw	1856

		Admitted
	Maclean, Alexander, of Carsaig, Aros	1835
	Maclean, Colonel Allan Thomas	1835
	Maclean, Archibald D., London	1837
	Maclean, Colin, of Laggan, Islay	1838
	Maclean, Donald, of Boreray	1822
2370	Maclean, Duncan, Belnollow, Crieff	1861
	Maclean, George, Hynish, Tyree	1849
	Maclean, Hector Frederick, W.S., Edinburgh	1854
	Maclean, Hugh, late of Coll	1819
	Maclean, Hugh, Brighton	1827
	M'Lean, James, St Martins, Fortrose	1857
	Maclean, James, Clerk of Supply, Wigtown	1860
	Maclean, John, Procurator-Fiscal, Perth	1860
	M'Lean, Lauchlan, Pittilie, Aberfeldy	1860
	Maclean, Dr Lachlan, Tobermory	1823
2380	Maclean, Neil, Land-Surveyor, Inverness	1837
	Maclean, Patrick, of Hawkhill, Fortrose	1845
	Maclean, William, of Plantation, Glasgow	1838
	Macleay, Alexander D., Bilbster, Wick	1846
	Macleay, Kenneth, of Newmore, Wick	1839
	M'Lellan, W. H., of Marks, Kirkcudbright	1857
	Maclelland, Thomas, North Balfern, Kirkinner	1857
	Maclennan, John	1840
	Macleod, Alexander, of Canada	1811
	Macleod, Alexander Norman	1817
2390	Macleod, Donald, Kingsburgh, Skye	1830
	Macleod, Donald, Claggan, Dunvegan	1841
	Macleod, John N., Banker, Kirkcaldy	1849
	Macleod, Martin, of Drynoch, Dunvegan	1831
	Macleod, Norman, of Dalvey, Forres	1839
	Macleod, Norman, of Macleod, London	1839
	Macleod, Robert Bruce Æneas, of Cadboll, Tain	1854
	Macleod, Colonel William	1817
	M'Michan, Bernard, Whitehill, Castle-Douglas	1854
	M'Michael, George, Fallowheat, Castle-Douglas	1860
2400	Macmillan, Donald, of Lephenstrath, Campbeltown	1825
	Macmillan, James, of Lamloch, Carsphairn	1834
	M'Millan, John Gordon, of Ballinakill, Clachan	1861
	M'Millan, John, Newton-Stewart	1860
	M'Minn, Francis, Edinburgh	1854
	M'Murchy, Donald, Backs, Campbeltown	1857
	M'Murrich, James, of Stuckgown	1852
	M'Murtrie, John, Ayr	1854
	M'Nab, Duncan, Writer, Stirling	1855

		Admitted
	Macnab, James Monro	1837
2410	Macnaghten, J. Steuart, of Inver Trossach, Callander	1855
	M'Nair, James, of Auchineck, Drymen	1838
	M'Nair, James, Smerly, Campbeltown	1857
	MacNair, John, Brewer, Leith	1857
	M'Naughton, Alexander, Remony, Kenmore	1857
	M'Naughton, Alexander, Kerrowmore, Fortingal	1859
	Macnaughton, James, of Smithfield, Ayr	1854
	M'Naughton, Thos., Carrine, Campbeltown	1857
	Macneale, Hector, of Ugadale, Campbeltown	1848
	M'Neill, Alexander, of Bordland, Noblehouse	1859
2420	M'Neill, Archibald, P.C.S., Edinburgh	1846
	M'Neill, Charles, Lossit, Ballygrant	1861
	Macneill, John, of Ardnacross, Aros	1847
	Macneill, Lieut.-General Roderick	1817
	M'Neill, M. M., younger of Carskey, Campbeltown	1839
	M'Neill, Robert, Letter, Killearn	1857
	M'Neill, John Carstairs, of Gigha	1860
	M'Neillie, William, of Castlehill, Dumfries	1861
	M'Nie, Wm. C., Woodyett, Stirling	1859
	Macnicol, Lieutenant Nicol, Dunans, Strachur	1836
2430	M'Niven, Alex., Sheemore, Luss	1857
	M'Noe, John, Flatts of Cargen, Dumfries	1860
	M'Onie, John, Auchmour, Drymen	1857
	Maconochie, Robert Blair, W.S., Edinburgh	1852
	M'Phail, Alex., Drumgarve, Campbeltown	1857
	Macpherson, Alex., M.D., Garbity, Craigellachie	1841
	Macpherson, Allan, London	1822
	Macpherson, Captain, Breakachy, Laggan	1854
	Macpherson, Ewan, of Cluny Macpherson, Kingussie	1827
	Macpherson, George, Gibston, Huntly	1850
2440	Macpherson, James, Nuide, Kingussie	1856
	Macpherson, John, Blantyre, Glasgow	1856
	Macpherson, John, Kenmore	1857
	Macpherson, John, Killihuntly, Kingussie	1860
	Macpherson, Lachlan, Biallidmore, Kingussie	1839
	Macpherson, William, of Blairgowrie	1822
	M'Queen, James, Arneive, Blairdrummond	1857
	Macqueen, Robert, of Braxfield, Biggar	1842
	Macqueen, Captain Simon	1820
	Macrae, Alexander, Askernish, Caranish	1832
2450	Macrae, Archibald, M.D.	1839
	Macrae, Donald, Luskintyre, Harris	1850
	Macrae, Donald, Banker, Kingussie	1863

		Admitted
	Macrae, Rev. Finlay, North Uist	1841
	Macredie, Pat. Boyle Mure, of Perceton, Kilmarnock	1830
	Macritchie, Charles Elder, Edinburgh	1831
	Macritchie, Thomas Elder, of Craigton, W.S., Edin.	1831
	Mactaggart, Captain J. O., of Seafield, Ayr	1835
	M'Tavish, Alexander S., Killin	1861
	M'Tavish, Duncan, Dalmore, Campbeltown	1857
2460	Mactier, Alexander Walker, of Durris, Aberdeen	1848
	Macvicar, Rev. J. G., D.D., Moffat	1828
	Macwilliam, Alexander, Bucharn, Huntly	1850
	M'William, James, Upper Kidston, Peebles	1855
	Madden, Henry R., M.D., Brighton	1839
	Main, Alexander James, Whitehill, Lasswade	1847
	Maitland, George F., of Hermand, West Calder	1852
	Maitland, George R., W.S., Edinburgh	1863
	Maitland, James, Scotstown, Insch, Aberdeen	1856
	Maitland, James, jun., Little Methlic, Methlic	1858
2470	Maitland, Rev. Jas., D.D., Kells, New Galloway	1860
	Maitland, William, Netherton, Insch	1858
	Makgill, George, of Kemback	1841
	Malcolm, John, of Poltalloch, Lochgilphead	1860
	Malcolm, W. E., of Burnfoot, Langholm	1840
	Mangles, George, Givendale, Ripon, Yorkshire	1861
	Mann, John, Glasgow	1847
	Mansfield, Thomas, Accountant, Edinburgh	1827
	Manson, James, Oakhill, Old Meldrum	1855
	Marjoribanks, Dudley Coutts, of Guisachan, M.P.	1856
2480	Marjoribanks, John, Roseneath	1856
	Marjoribanks, William, Merchant, Leith	1854
	Marr, James, of Alderston, F.R.C.P.E., Mid-Calder	1861
	Marr, William Smith, Mill of Tillyhilt, Tarves	1855
	Marshall, James, Jeweller, Edinburgh	1833
	Marshall, John, Airbles, Farm, Motherwell	1860
	Marshall, John, Killbreck, Lairg	1847
	Marshall, John, younger of Curriehill, Edinburgh	1854
	Marshall, Robert, Gateside, Kirkliston	1850
	Marshall, Thomas, The Howes, Annan	1860
2490	Marshall, Captain William, Rothesay	1845
	Martin, Donald, Monkstadt, Portree	1858
	Martin, James, Flesher, Aberdeen	1858
	Martin, James Watson, Broomhouse, Corstorphine	1850
	Martin, John, Claggan, Kenmore	1858
	Martin, Montague T., Mansion House, Greenock	1859
	Martin, Dr Nicol, of Glendale, Dunvegan	1854

		Admitted
	Martin, William, Kilmartin, Lochgilphead	1844
	Mason, Robert, of Meadowbank, Edinburgh	1859
	Mason, Thomas, Palinsburn Cottage, Coldstream	1854
2500	Mather, Arthur, Nether Place, Newton Mearns	1850
	Matheson, Alexander, of Ardross, M.P.	1846
	Matheson, Major-General Thomas	1847
	Mathew, William, Newton of Kingsdale, Kennoway	1862
	Mathews, Niven, Whitehills, Garliestown	1853
	Mathieson, George, of Clifton Lodge, Edinburgh	1854
	Matthew, Alexander, Forret, Cupar-Fife	1861
	Maxton, John, Drylaw House, Davidson's Mains	1835
	Maxwell, Edward Heron, of Teviotbank, Hawick	1861
	Maxwell, Francis, of Breoch, Dumfries	1841
2510	Maxwell, Francis, Glasgow	1844
	Maxwell, Francis, of Drum Park, Dumfries	1861
	Maxwell, John Hall, of Dargavel, C.B., Secretary of the Society	1838
	Maxwell, Robert, Bellochgair, Campbeltown	1857
	Maxwell, Wellwood H., of Munches, Dalbeattie	1839
	Maxwell, Wellwood, of The Grove, Dumfries	1858
	Maxwell, Wellwood, of Glenlee, New Galloway	1855
	Maxwell, William, of Carruchan, Thornhill	1837
	May, George, Civil Engineer, Inverness	1839
	Mayne, Robert, Merchiston, Edinburgh	1838
2520	Meall, James, Buttergask, Coupar-Angus	1852
	Mears, William, Commission Agent, Edinburgh	1859
	Meason, Magnus Gilbert Laing, of Ballinshoe	1836
	Meek, George, of Campfield, Lanark	1814
	Megget, Thomas, W.S.	1811
	Meiklam, John, of Gladswood, Melrose	1857
	Meikle, David, Clunie Mains, Kinglassie	1854
	Meikle, James, Writer, Kilmarnock	1858
	Meikle, John, Nether Mains, Kilwinning	1858
	Meiklejon, John, Foundry, Dalkeith	1862
2530	Mein, Andrew Whytock, of Hunthill, Jedburgh	1861
	Mein, Benjamin, Roxburgh Barns, Kelso	1863
	Mein, Nicol A., Marsh House, Canonbie	1860
	Mein, Robert, Factor to the Duke of Bedford	1838
	Meldrum, Alex., of Easter Kincaple, Guard Bridge	1841
	Meldrum, David, of Craigfoodie, Cupar-Fife	1857
	Meldrum, James, Durie, Leven	1860
	Melrose, Jonathan, Newbigging, Coldstream	1854
	Melville, James Moncrieff, W.S., Edinburgh	1848
	Melville, James, Callange, Ceres	1861

		Admitted
2540	Melville, John Whyte, of Bennochy, St Andrews	1819
	Melvin, Charles, Ratho Mains, Ratho	1862
	Melvin, James, Bonnington, Ratho	1849
	Menzies, Andrew, of Balornock, Glasgow	1857
	Menzies, Fletcher Norton, Tirinie, Aberfeldy	1841
	Menzies, Graham, London	1853
	Menzies, James, Auch, Tyndrum	1857
	Menzies, James A. Robertson, Surgeon, Annat	1849
	Menzies, John S., of Chesthill, Aberfeldy	1821
	Menzies, Ranald, of Culdares, Fortingall	1842
2550	Mercer, Daniel, Achamore, Dunoon	1861
	Mercer, Græme, of Gorthy, Perth	1850
	Mercer, John, Ardnadam, Dunoon	1861
	Mercer, Major, Edinburgh	1853
	Merricks, James, Gunpowder Manufacturer, Roslin	1841
	Merry, James, of Belladrum, M.P.	1838
	Middleton, Charles Stuart, Merchant, Liverpool	1840
	Middleton, John, Moray Place, Edinburgh	1863
	Middleton, William, Bridgefoot, Monymusk	1858
	Mill, James, Surgeon, Thurso	1839
2560	Mill, Robert, Overseer, Balgowan, Perth	1861
	Millar, Andrew, Niddry Mains, Kirkliston	1853
	Millar, C. H., Merchant, Montrose	1853
	Millar, James, Kinnear, Kilmany, Cupar-Fife	1862
	Millar, James Lawson, Waukmill, Dunfermline	1852
	Millar, John, South St Andrew Street, Edinburgh	1848
	Millar, Thomas, West Briggs, Kirkliston	1853
	Millar, Thomas, of Ballilieśk, Muckart, Stirling	1854
	Miller, Captain Alexander Penrose	1843
	Miller, George, of Frankfield, Glasgow	1814
2570	Miller, George, Cattle Agent, Delvine, Dunkeld	1861
	Miller, Hew, Ochtertyre, Crieff	1853
	Miller, John, of Leithen, Millfield, Polmont	1847
	Miller, John, Dounreay, Thurso	1861
	Miller, O. G., Merchant, Dundee	1843
	Miller, Thomas, Stockbroker, Edinburgh	1854
	Milligan, James, Hayfield, Thornhill	1855
	Mills, Charles, Gilmanscleuch, Selkirk	1863
	Mills, George, Greenend, St Boswells	1857
	Mills, George, The Castle, Peebles	1859
2580	Mills, Thomas, Mount Benger, Selkirk	1863
	Milne, Alexander, Corse of Kinnoir, Huntly	1858
	Milne, Alexander, of Gartfarrie, Moodiesburn	1844
	Milne, Alexander, Mains of Eslemont, Ellon	1851

		Admitted
	Milne, Alexander, Mill of Allathan, Udny	1855
	Milne, George, of Kinaldie, Aberdeen	1851
	Milne, George, Haddo, Methlic	1851
	Milne, James, Nethertown, Rosehearty	1856
	Milne, James, Pitsligo Castle, Rosehearty	1856
	Milne, James, Kilduthie, Banchory	1857
2590	Milne, James, Buchanstone, Oyne	1858
	Milne, James, Meinfoot, Ecclefechan	1859
	Milne, James, Cairnhill, Huntly	1862
	Milne, Nicol, of Faldonside, Melrose	1841
	Milne, Peter, Blackford, Edinburgh	1861
	Milne, William, Mains of Waterton, Ellon	1851
	Mitchell, Alexander, of Sauchrie, Maybole	1851
	Mitchell, Alexander, Alloa	1857
	Mitchell, Alex., of Stow, Carolside, Earlston	1863
	Mitchell, Andrew, Alloa	1848
2600	Mitchell, David, Scotston of Kirkside, Montrose	1861
	Mitchell, David, Burnton, Laurencekirk	1861
	Mitchell, Duncan, Blairvockie, Luss	1857
	Mitchell, George, Authnagathle, Whitehouse	1852
	Mitchell, Houston, of Polmood	1848
	Mitchell, Hugh, Balligreggan, Campbeltown	1857
	Mitchell, James, Little Knox, Castle-Douglas	1851
	Mitchell, James, Drum, Campbeltown	1857
	Mitchell, James P., Traprain, Prestonkirk	1855
	Mitchell, John, Inverscaddle, Ardgour	1843
2610	Mitchell, John, Ballemenach, Campbeltown	1850
	Mitchell, John, Flisk Mill, Newburgh	1861
	Mitchell, John, Lordscairney, Cupar-Fife	1862
	Mitchell, John M., Merchant, Leith	1832
	Mitchell, Joseph, Civil Engineer, Inverness	1836
	Mitchell, Robert, Cadham, Markinch	1852
	Mitchell, Robert, Skelpie, Pitlessie	1859
	Mitchell, Samuel, Strath, Campbeltown	1850
	Mitchell, Thomas, Kirkhope, Selkirk	1853
	Mitchell, William, Succoth, Arrochar	1857
2620	Mitchell, William, Merchant, Montrose	1862
	Mitchell, William Gillespie, of Carwood, Biggar	1849
	Mitchelson, Arch. Hepburne, Old Faskally	1832
	Moffat, George, Strathconan, Beauly	1861
	Moffat, James, Garwald, Langholm	1850
	Moffat, James, Gateside, Kirkconnel	1860
	Moffat, John, Craik, Hawick	1850
	Moffat, John, Broadchapel, Lochmaben	1860

		Admitted
	Moffat, Thomas, Drumbog, Sanquhar	1862
	Moffat, William, Craigbeck, Moffat	1851
2630	Moffat, William, Town-Clerk, Dingwall	1863
	Moir, Benjamin, Merchant, Aberdeen	1840
	Moir, James, Mains of Wardhouse, Insch	1858
	Moir, John M., of Hillfoot and Milton, Dollar	1834
	Moir, Robert, of Easterton, Tarty, Ellon	1851
	Moir, Robert Graham, of Leckie, Stirling	1850
	Moncreiff, James, M.P., Lord Advocate	1848
	Moncrieff, Alexander, W.S., Perth	1842
	Moncrieff, Alexander, of Barnhill, Perth	1852
	Moncrieff, George, Solicitor, Perth	1852
2640	Moncrieff, Robert Scott, of Fossoway, Dalkeith	1831
	Monro, Alex., of Craiglockhart, Edinburgh	1835
	Monro, Alexander Binning, of Auchinbowie, Stirling	1833
	Monro, David, of Allan, Tain	1851
	Monteath, Brydon, Liberton Tower, Edinburgh	1846
	Monteath, John, of Monkridden Mains	1845
	Monteith, Robert, of Carstairs	1837
	Montgomerie, Rear-Admiral Alexander	1834
	Montgomery, John H., of Newton	1846
	Moore, John Carrick, of Corsewall, Stranraer	1839
2650	Moray, Charles Home Drummond, Abercairney, Crieff	1852
	Morison, Alex., of Bognie, Mountblairy House, Turriff	1850
	Morison, Andrew, Flawcraig, Errol	1852
	Morison, James, Rossie, Dunning	1861
	Morison, James G., Glasgow	1850
	Morison, John B. Brown, of Finderly, Kinross	1862
	Morrieson, Robert, Heriot Row, Edinburgh	1833
	Morrison, Charles, of Islay, Bowmore	1855
	Morrison, Harry L. L., Guise, Whitehouse, Aberdeen	1858
	Morrison, James, Glasgow	1850
2660	Morrison, James, Mains of Montcoffer, Banff	1856
	Morrison, John, Wester Dalmeny, South Queensferry	1859
	Morrison, William, Cairnie, Forteviot	1861
	Morton, Hugh, Engineer, Edinburgh	1835
	Morton, James, Townhead of Drumley, Tarbolton	1857
	Morton, John, Lambieletham, St Andrews	1861
	Morton, John, North Muirton, Perth	1861
	Mosman, Capt. Hugh, of Auchtyfardle, Lesmahagow	1850
	Mosman, Hugh, yr. of Auchtyfardle, Lanark	1859
	Moubray, John Marshall, W.S., Edinburgh	1843
2670	Moubray, Robert, Cambus Distillery, Stirling	1862

		Admitted
	Moyes, James, Balwearymill, Kirkcaldy	1861
	Mudie, John, of Pitmuies, Forfar	1840
	Muir, George W., Caberston, Innerleithen	1852
	Muir, James, Barone Park, Rothesay	1849
	Muir, John	1843
	Muir, John, Lochfergus, Kirkcudbright	1859
	Muirhead, Claud, Heriot Row, Edinburgh	1820
	Muirhead, E. W., Lethendy, Scone, Perth	1862
	Mundell, David, Auchindrean, Lochbroom	1858
2680	Munro, Donald, Stornoway	1857
	Munro, Hugh Andrew Johnston, of Novar, Evanton	1832
	Munro, John, Fairnington, Kelso	1853
	Murdoch, Alexander, Hilton, Bishopbriggs	1857
	Murdoch, James, Carntyne, Shettleston	1854
	Murdoch, John Burn, of Gartincaber, Advocate	1853
	Murdoch, Peter, Newton-Mearns	1839
	Murdoch, Robert, Hallside, Cambuslang	1857
	Murdoch, William, Huntly	1856
	Mure, David, Advocate, M.P.	1847
2690	Mure, James O. Lockhart, of Livingstone	1828
	Mure, Lieut.-Colonel William, of Caldwell, Beith	1861
	Mure, William, Kirkcudbright	1841
	Murray, Andrew, of Conland	1846
	Murray, Anthony, of Dollerie, W.S., Edinburgh	1828
	Murray, Rev. George, of Troquhain, New Galloway	1860
	Murray, George, New Zealand	1854
	Murray, Jack W., Captain R.N.	1843
	Murray, James, Monkland Iron Works, Glasgow	1828
	Murray, James, of Craigend, Drochil Castle, Peebles	1840
2700	Murray, James, East Barns, Dunbar	1850
	Murray, James, Dumfries Arms Hotel, Old Cumnock	1857
	Murray, James, Strathleven, Dumbarton	1861
	Murray, John D., of Murraythwaite, Ecclefechan	1825
	Murray, John Nesbitt, of Philiphaugh, Selkirk	1846
	Murray, John, Merchant, Laurencekirk	1859
	Murray, John, Woodend House, Kilmarnock	1860
	Murray, John L., of Heavyside, Biggar	1862
	Murray, Lieut.-Col. John, of Polmaise, Stirling	1863
	Murray, Dr John, Kersknow, Kelso	1863
2710	Murray, Joseph, of Ayton, Bridge of Earn	1820
	Murray, Kenneth, Banker, Tain	1851
	Murray, Robert, Spittal, Penicuik	1850
	Murray, Robert, Edinburgh	1858

		Admitted
	Murray, Robert, Strathgray, Blair-Athole	1861
	Murray, Colonel Samuel Hood, Aberfeldy	1834
	Murray, Sutherland, Kirkton, Golspie	1851
	Murray, Thomas, Eastside, Penicuik	1857
	Murray, Thomas Graham, W.S., Edinburgh	1852
	Murray, Walter, Walston, Penicuik	1854
2720	Murray, William, Kilcoy, Dingwall	1856
	Murray, William, Mains of Pittendregh, Turriff	1858
	Murray, William Hugh, of Geanies, Tain	1846
	Murrie, John, Provost of Stirling	1859
	Mustard, Alexander, Leuchland, Brechin	1859
	Mutrie, David, Merchant, Glasgow	1804
	Mutter, John, Wester Melville, Lasswade	1857
	Myers, George Cooper, Town-Clerk, Montrose	1858
	Mylne, Thomas, Niddrie Mains, Liberton	1850
	Mylne, William, Lochhill, Aberlady	1841
2730	NORTHESK, The Right Hon. William, Earl of	1843
	NAPIER, The Right Hon. Francis, Lord	1843
	NEAVES, The Hon. Lord	1846
	NAPIER, Sir Robert John Milliken, of Milliken, Bart.	1848
	NICHOLSON, Sir Arthur, of Nicholson, Bart.	1812
	Nairne, John Mellis, of Dunsinnan, Perth	1852
	Naismith, Alexander, Windlestrawlee, Edinburgh	1852
	Napier, Dugald, Port-Dundas, Glasgow	1857
	Napier, George, Advocate, Sheriff of Peeblesshire	1840
	Napier, Robert, of Shandon, Helensburgh	1844
2740	Nasmyth, Robert, Edinburgh	1839
	Neilson, Jas. Beaumont, of Queenshill, Kirkcudbright	1851
	Nelson, Michael, Gallamuir, Stirling	1859
	Nelson, William, Claddens, Bishopbriggs	1857
	Newall, John, Mexico	1845
	Newton, James Ewan, Linnbank House, Lanark	1838
	Newton, Robert P., of Castlelandhill, Kerse, Falkirk	1837
	Nicholson, Robert, Lochbank, Dumfries	1861
	Nicol, James Dyce, of Ballogie, Aboyne	1853
	Nicoll, Alexander	1844
2750	Nicolson, Major Allan Macdonald, of Ardmore	1819
	Nicolson, James Badenach, yr. of Glenbervie, Fordoun	1857
	Nicolson, Neil, Backs, Campbeltown	1857
	Nielson, Andrew, Bank of Scotland, Glasgow	1843
	Nimmo, James, Sighthill, Corstorphine	1847
	Nimmo, Matthew, Foot of Green, Stirling	1852

		Admitted
	Nisbet, John, Rumbleton, Greenlaw, Dunse	1854
	Nisbet, Ralph P., Row Wood, Chalfont St Giles	1855
	Nisbett, John More, of Cairnhill, Drum, Edinburgh	1847
	Niven, Alexander T., C.A., Edinburgh	1860
2760	Nivison, Thomas, Burn, Thornhill	1852
	Noble, Charles, younger of Berryhill, Peterhead	1858
	Noble, John, London	1838
	Noble, William, London	1838
	Norie, Henry Hay, Factor, Kilmarnock	1862
	Norman, William, Oughterside, Carlisle	1860
	Normand, James, of Whitehill, Aberdour	1861
	OGILVY, The Hon. William, of Loyal, Forfar	1823
	OGILVY, The Hon. Donald, of Clova, Forfar	1824
	OGILVY, The Hon. William Bruce, of Cowden, Dollar	1862
2770	ORMIDALE, The Hon. Lord	1854
	OGILVY, Sir John, of Inverquharity, Bart., M.P.	1824
	ORDE, Sir John Powlett, of Kilmory, Bart.	1830
	ORR, Sir Andrew, of Harviestoun, Glasgow	1844
	Odams, James, Fenchurch Street, London	1859
	Ogilvie, Archibald, Salisbury Road, Edinburgh	*1854
	Ogilvie, Captain William, R.N.	1820
	Ogilvie, William, of Chesters, Jedburgh	1809
	Ogilvie, William, Broadhaugh, Hawick	1853
	Ogilvie, George, Holefield, Kelso	1860
2780	Ogilvy, Charles, Eastbank, Brechin	1850
	Ogilvy, John, of Inshewan, Forfar	1836
	Ogilvy, John, Harecraig, Dundee	1859
	Ogilvy, Peter Wedderburn, of Ruthven, Meigle	1826
	Ogilvy, Thomas, younger of Ruthven, Meigle	1844
	Ogilvy, Thomas, of Corrimony, Inverness	1838
	Ogston, Alexander, of Ardoe, Aberdeen	1840
	Oliver, James, Howpasley, Hawick	1850
	Oliver, James, Bridge House, Hawick	1852
	Oliver, Robert, of Blakelaw, Kelso	1853
2790	Oliver, Thomas, West Fortune, Drem	1855
	Oliver Thomas, Millburn Cottage, Corstorphine	1856
	Oliver W. Elliot, Glenforsa, Mull	1858
	Oliver, William, of Langraw, Bonchester Bridge	1863
	Ord, John, of Muirhouselaw, Nisbet, Kelso	1841
	Orde, John William Powlett, younger of Kilmory	1858
	Ormiston, William T., of Glenburnhall, Jedburgh	1848
	Oswald, Alexander, of Auchincruive, Ayr	1845
	Oswald, James Townshend, of Dunnikier, Kirkcaldy	1848

		Admitted
	Otto, William Ellison, Factor, Newbattle, Dalkeith	1863
2800	Ovens, Thomas, Merchant, Galashiels	1851
	†Polwarth, The Right Hon. Henry, Lord	1829
	Polwarth, The Hon. Walter Scott, Master of	1863
	Pollok, Sir Hew Crawford, of Pollok, Bart.	1846
	Pringle, Sir John, of Newhall, Bart.	1810
	Pagan, Allan Cuningham, Invergeldie, Comrie	1852
	Pagan, Samuel A., M.D., Edinburgh	1848
	Pagan, William, of Clayton, Cupar-Fife	1845
	Palmer, John, Lincoln	1857
	Park, Alexander B., Woodend, Kelso	1863
2810	Park, James, Cliftonhall Mains, Ratho	1859
	Park, Thomas, Stoneyhill, Musselburgh	1854
	Park, William, of Blegbie, Melrose	1849
	Parker, John, Nether Broomlands, Irvine	1857
	Parkes, Samuel, London	1817
	Pate, Thomas, South Draffan, Lesmahagow	1857
	Paterson, Alexander, Wine-Merchant, Leith	1840
	Paterson, Alexander, Mains of Mulben, Keith	1853
	Paterson, Alexander, Carmacoup, Douglas	1860
	Paterson, Archibald, Meadowfield, Corstorphine	1848
2820	Paterson, David, Cattadale, Campbeltown	1857
	Paterson, D. A., Merchant, Leith	1854
	Paterson, George, of Castle Huntly	1841
	Paterson, James, Whitehouse, Lamlash	1853
	Paterson, James, of Longbedholm, Moffat	1860
	Paterson, James W., Craigend, Dumfries	1861
	Paterson, James, Chapelhill, Hawick	1862
	Paterson, James Erskine, Morningside, Edinburgh	1862
	Paterson, John, East Preston, Kirkbean	1850
	Paterson, John, junior	1847
2830	Paterson, John, Macoriston, Doune	1852
	Paterson, John, Skirling Mains, Biggar	1857
	Paterson, John, Tanner, Dalkeith	1860
	Paterson, John, Eastfield, Penicuik	1860
	Paterson, John, Howcleuch, Moffat	1862
	Paterson, J. W., Terrona, Langholm	1854
	Paterson, P. Hay, of Carpow, Newburgh	1849
	Paterson, Robert, of Birthwood, Biggar	1848
	Paterson, Robert, of Brocklehirst, Dumfries	1835
	Paterson, Walter, Merchant, Glasgow	1851
2840	Paterson, William, Twiglees, Lockerbie	1851
	Paterson, William, Kilnknowe, Galashiels	1863

		Admitted
	Patison, John, W.S., Edinburgh	1846
	Paton, Alexander, Macnairston, Ayr	1857
	Paton, John, Balbedie, Lochgelly	1859
	Paton, John, of Crailing, Jedburgh	1833
	Paton, John, of Grandholm, Aberdeen	1841
	Paton, Robert, Cloberhill, Dumbarton	1854
	Patterson, John, Westerton of Cowie, Stirling	1850
	Patterson, Robert, Stirling	1851
2850	Patton, George, of Cairnies, Advocate, Edinburgh	1843
	Pattullo, George, Dundee	1861
	Pattullo, Peter, Eassie Farm, Glammis	1861
	Paul, Rev. John, D.D., Edinburgh	1839
	Paul, William, Advocate, Aberdeen	1855
	Paul, William, Kilnflat, Forres	1855
	Payne, James, Carruchan, Dumfries	1860
	Peake, John, Craigend, Stow	1857
	Pearson, Andrew A., of Springfield, Carluke	1854
	Pearson, David A., of North Cliff, Queensferry	1863
2860	Peat, John, Manor, Stirling	1858
	Peddie, William, of Blackruthven, Perth	1828
	Pender, George, Dumbreck, Kilsyth	1857
	Pender, Thomas	1839
	Penman, John, Bonally, Colinton	1859
	Penny, Thomas, Bartlehill, Coldstream	1863
	Peter, Charles, Canterland, Marykirk	1854
	Peter, John, Croyard, Beauly	1854
	Peter, John, of Over Possil, Glasgow	1862
	Peter, Robert, Banker, Aberfeldy	1849
2870	Peterkin, William, Woodside, Cullen	1861
	Philip, George, Boynds, Keith Hall	1856
	Philip, John, Polton Mains, Lasswade	1851
	Philip, Robert, Leith	1844
	Philip, William, Lofthillock, Keith Hall	1858
	Phillips, Hugh, Cracrop, Stapleton, Carlisle	1860
	Phillips, John, Laighpark, Milngavie	1854
	Phillips, John Douglas, St Colme, Aberdour,	1862
	Picken, James, Righead, Stewarton	1857
	Picken, James H., of Hillhouse Lodge, Fenwick	1857
2880	Picken, John, Mansfield Mains, New Cumnock	1857
	Picken, Robert, Burnkirk, Newton-Stewart	1860
	Pierson, James Alexander, of The Guynd, Arbroath	1863
	Pirie, James, Orchardton, Udny	1855
	Pitcairn, John, of Pitcullo, Cupar	1841
	Pitcairn, William, Cunnoquhie House, Cupar-Fife	1861

		Admitted
	Pitman, Frederick, W.S., Edinburgh	1859
	Pittendrigh, Alexander, Glaslaw, New Pitsligo	1858
	Pittendrigh, Alexander, Newseat, Fraserburgh	1859
	Pittendrigh, John, Bodychell, Fraserburgh	1857
2890	Playfair, Dr Lyon, C.B., Professor of Chemistry, University of Edinburgh	1859
	Plenderleith, Archibald, Moorfoot, Gorebridge	1859
	Plummer, Charles Scott, of Sunderlandhall, Selkirk	1842
	Plummer, George Hay, Melville, Dalkeith	1850
	Plummer, John, Lauriston Place, Edinburgh	1860
	Pollexfen, James R., of Cairston, W.S., Edinburgh	1841
	Pollok, Allan, of Faside, Newton Mearns	1844
	Pollok, Arthur, of Lochlibo, Broom, Newton Mearns	1815
	Polson, John, Moy, Dingwall	1853
	Ponton, George, Woolston, Linlithgow	1852
2900	Pople, John B., Birnam Hotel, Dunkeld	1861
	Porteous, Alexander, of Lauriston, Montrose	1851
	Porter, James, Monymusk, Aberdeen	1855
	Porter, John Thos. Brown, Lincoln	1859
	Pott, Gideon, of Knowsouth, Jedburgh	1854
	Potts, Andrew, Lewinshope, Selkirk	1863
	Powrie, Archibald, Lairwell, Perth	1861
	Powrie, James, of Reswallie, Forfar	1849
	Poynter, John, Glasgow	1856
	Prentice, George, of Strathore, Kirkcaldy	1855
2910	Prentice, James, Bankhead, Kirkcaldy	1861
	Prentice, John, Tollcross, Edinburgh	1861
	Primrose, James, Turniedykes, Ford	1855
	Primrose, James Thomson, Sauchland, Ford	1863
	Pringle, Alexander, of Whytbank, Selkirk	1859
	Pringle, David, of Wilton Lodge, Hawick	1863
	Pringle, James Hall, of Dirrie, Cleethaugh, Jedburgh	1863
	Pringle, John, Agricultural Implement Agent, Edin.	1863
	Pringle, Robert K., of Broadmeadows, Selkirk	1852
	Proudfoot, John, Inveresk, Musselburgh	1848
2920	Purdie, Thomas, Edinburgh	1856
	Purves, Andrew, Pressmenan, Stenton	1860
	Purves, Charles, Crichton Mains, Ford	1855
	Purves, George, Elemscleugh, Innerwick	1853
	Purves, James, Thurdistoft, Thurso	1839
	Purves, James, junior, Lochend, Dunnet, Thurso	1861
	Purves, John, of Kinaldie, St Andrews	1844
	Purvis, John, Balbirnie Mill, Markinch	1859
	Purves, William, Burnfoot, Kelso	1851

Admitted

RICHMOND and LENNOX, His Grace Charles, Duke of 1840
2930 *ROXBURGHE, His Grace James, Duke of, K.T. 1837
†ROSEBERY, The Right Hon. Arch., Earl of, K.T. 1806
†ROSSLYN, The Right Hon. James, Earl of 1835
ROLLO, The Right Hon. John, Lord 1857
RICHARDSON, Sir John Stewart, of Pitfour, Bart. 1823
RIDDELL, Sir Thomas Miles, of Sunart, Bart. 1845
RADCLIFFE, Sir Joseph, of Millsbridge, Bart. 1820
RUSSELL, Sir William, of Charlton, Bart. 1853
Rae, Alexander, Invergowrie, Dundee 1862
Rae, William, Gateslack, Thornhill 1860
2940 Raeburn, Henry, of Howden, Midcalder 1806
Rainy, Dr Alexander, Hallforest, Kintore 1858
Rainy, George, of Rasay, Broadford 1846
Rait, D. C., Goldsmith, Glasgow 1838
Rait, James, of Anniston, Arbroath 1854
Ramsay, Alexander, of Demerara 1806
Ramsay, John, of Kildalton, Bowmore 1856
Ramsay, Captain John, of Barra, Straloch, Aberdeen 1856
Ramsay, Robert B. Wardlaw, of Whitehill, Lasswade 1841
Ramsay, Captain, Paxton House, Berwick 1854
2950 Ramsay, Maj.-Gen. W. Maule, Dalhousie Castle 1861
Ramsay, Professor William, Glasgow 1844
Ramsay, Lt.-Col. Wm. Burnett, of Banchory Lodge 1841
Ranken, Bryce Macmurdo, Proc.-Fisc. of Orkney 1841
Ranken, George, Australia 1839
Ranken, Patrick, of Mavisbank, Glasgow 1844
Ranken, Thomas, S.S.C., Edinburgh 1838
Ranken, William, M.D., Glenlogan, Sorn 1836
Rankin, John A., of Muirhouse, Irvine 1857
Rankine, John, Lochlands, Maybole 1857
2960 Rannie, Henry A., Mill of Boyndie, Banff 1859
Rannie, Mordaunt Gordon, Edenmouth, Kelso 1859
Rannie, Robert Walker, Inchyra, Perth 1827
Rashleigh, William, of Menabilly, Fowey 1837
Rattray, Major James C., of Craighall, Blairgowrie 1854
Rawdin, Joseph, Chemist, Jedburgh 1856
Ray, William, Sunbank, Elgin 1854
Redfern, W. Macquarrie, London 1857
Reed, Ellerington, Kilcalmkill, Golspie 1847
Reed, Robert, Sidera, Golspie 1847
2970 Reid, Alexander, Cruivie, Cupar 1857
Reid, Benjamin L., Balcairn, Old Meldrum 1855
Reid, Charles G., W.S. 1844

		Admitted
	Reid, George, Seedsman, Aberdeen	1858
	Reid, James, Ballencrieff, Drem	1855
	Reid, James, Cattle-Dealer, Biggar	1857
	Reid, James, Greystone, Alford	1858
	Reid, James, Donavourd, Dunkeld	1861
	Reid, John, Dunglass, Campbeltown	1857
	Reid, John, Hilton of Aldie, Kinross	1859
2980	Reid, Patrick, Cattle-Dealer, Middleton, Gorebridge	1854
	Reid, Peter, Camis Eskan, Dumbarton	1855
	Reid, Peter, Nether Kildrummy, Mossat	1858
	Reid, Walter, Drem	1850
	Reid, William, of Hayston, Kirkintilloch	1857
	Rennie, James, Kessington, East Kilpatrick	1857
	Rennie, William, Banker, Maybole	1836
	Renton, Archibald Campbell, of Lamberton, Berwick	1857
	Renton, John, M.D., Edinburgh	1859
	Reoch, John F., of Gilmerton, St Andrews	1859
2990	Rhind, David, Architect, Edinburgh	1852
	Rhind, Josiah, Banker, Wick	1839
	Rhind, Macduff, Sheriff-Subs. of Wigtownshire	1843
	Richardson, David, of Hartfell, Paisley	1863
	Richardson, Francis, Merchant, Edinburgh	1849
	Richardson, James, Merchant, Edinburgh	1833
	Richardson, James T. Stewart, yr. of Pitfour, Perth	1861
	Richardson, John, Writer, Haddington	1851
	Richardson, John, Drylawhill, Prestonkirk	1863
	Richardson, Robert, Merchant, Edinburgh	1837
3000	Richardson, Robert, Haddington	1859
	Richardson, Maj.-Gen. Robertson, of Tullybelton, C.B.	1847
	Richardson, Thomas, of Ralston, Paisley	1854
	Richmond, George, Lawhill, Auchterarder	1861
	Richmond, John, Dron, Perth	1861
	Richmond, Matthew, Cararie, Ballantrae	1857
	Rickman, Thomas	1831
	Riddell, Thomas, Oxnam Nook, Jedburgh	1854
	Riddell, Wm., Hundalee, Jedburgh	1852
	Riddick, George, Greenhill-head, Lockerbie	1859
3010	Rigg, William, Banks, Kirkcudbright	1861
	Rintoul, Alex., Ladywell, Auchterarder	1861
	Rintoul, Charles, East Craigie, Cramond	1852
	Rintoul, David, Upper Cairnie, Forteviot	1861
	Rintoul, John, Ovenstone, Pittenweem	1861
	Ritchie, John, Newbigging Mains, Carnwath	1857

		Admitted
	Ritchie, Robert, Civil Engineer, Edinburgh	1833
	Ritchie, Thomas, Bowhouse, Alloa	1838
	Ritchie, William, Nether Liberton	1853
	Ritchie, William, of Middleton, Gorebridge	1848
3020	Ritchie, William, Plean Mill, Stirling	1852
	Robb, James, Gorgie, Slateford	1849
	Robb, James, Edinburgh	1862
	Roberton, Andrew, Hoselawbank, Kelso	1863
	Roberton, James, Ladyrig, Kelso	1841
	Roberton, John, Harperton, Kelso	1854
	Roberton, John, junior, Harperton, Kelso	1863
	Roberton, Robert, Ladyrig, Kelso	1863
	Robertson, Alexander, W.S., London	1825
	Robertson, Alexander, Ardlaw, Rosehearty	1856
3030	Robertson, Alexander Inglis, Aultnaskiach	1839
	Robertson, Andrew, Balmoral	1832
	Robertson, Arthur John, of Inshes, Inverness	1840
	Robertson, Dr Charles, Auchtercairn, Gairloch	1860
	Robertson, Daniel, Friarton, Perth	1861
	Robertson, David, of Ladykirk, M.P., Berwick	1842
	Robertson, David, Aberdeen	1847
	Robertson, David, Cloag, Methven	1861
	Robertson, David Souter, of Whitehill, Edinburgh	1847
	Robertson, Donald, of Pencross, Edinburgh	1854
3040	Robertson, Captain George A.	1817
	Robertson, George B., Whitekirk, Prestonkirk	1860
	Robertson, George Duncan, of Strowan, Perth	1839
	Robertson, James, Banker, Glasgow	1857
	Robertson, James, W.S., Edinburgh	1858
	Robertson, James, Inveraray	1836
	Robertson, James, Hall of Caldwell, Beith	1852
	Robertson, James, Denbrae, Cupar-Fife	1859
	Robertson, Jas Stewart, of Edradynate, W.S., Edin.	1851
	Robertson, Captain John	1825
3050	Robertson, John, Banker, Huntly	1847
	Robertson, John, Bowhouse, Polmont	1855
	Robertson, John, of Gartloch, Glasgow	1856
	Robertson, John, Glenlyon House, Fortingal	1854
	Robertson, John, S.S.C., Edinburgh	1859
	Robertson, John, Banchor, Kingussie	1863
	Robertson, Lawrence, Royal Bank, Edinburgh	1828
	Robertson, Neil, Frenich, Aberfoyle	1857
	Robertson, Peter S., Trinity Nurseries, Edinburgh	1862

		Admitted
	Robertson, Robert, of Auchleeks, Blair-Athole	1845
3060	Robertson, Stewart, of Derculich, Logierait	1843
	Robertson, Stewart Souter, yr. of Whitehill, Edin.	1861
	Robertson, Wilfred Mason, of Gartloch, Moodiesburn	1859
	Robertson, William, of Kinlochmoidart, Strontian	1826
	Robertson, William, Burnside, Ballindalloch	1852
	Robertson, William, Erray, Tobermory	1856
	Robertson, William, Cuttlebrae, Fochabers	1857
	Robeson, Robert, Springwells, Coldstream	1863
	Robey, Robert, Engineer, Lincoln	1859
	Robinow, Adolph, Merchant, Leith	1851
3070	Robson, Charles, Lurdenlaw, Kelso	1841
	Robson, John, East Kielder, Northumberland	1853
	Robson, Neil, C.E., Glasgow	1857
	Robson, William, Kilbreck, Lairg	1850
	Rodger, David, Penkiln, Garlieston	1851
	Rodger, George, Bridgelands, Selkirk	1861
	Rodger, Matthew, Rossland, Bishopton	1854
	Rodger, Peter, Selkirk	1859
	Rodger, Robert, Hadlow Castle, Tunbridge	1838
	Roger, Hugh, Attiquin, Maybole	1857
3080	Rogers, James S., Rose Mill, Dundee	1862
	Rogerson, George, Piersbyhall, Lockerbie	1851
	Rogerson, William, of Gillesbie, Lockerbie	1829
	Rolland, Adam, of Gask	1837
	Ronaldson, Alexander, Glasgow	1857
	Rome, R. M., Ruggetshaws, Langholm	1860
	Rose, James, W.S., Edinburgh	1839
	Rose, William, Fosterseat, Elgin	1854
	Ross, Alexander, Inchley, Banchory	1857
	Ross, Crawford, Cadboll, Tain	1857
3090	Ross, George, of Pitcalnie, Parkhill	1839
	Ross, Lieut.-Col. George W. H., of Cromarty	1849
	Ross, James, Newton-lees, Kelso	1863
	Ross, Major-General James K., K. H., of Lawrence Park, Falkirk	1839
	Ross, Harry, junior, Wester Coull, Tarland	1858
	Ross, John Leith, of Arnage, Ellon	1843
	Ross, Richard Louthian, of Staffold	1804
	Ross, Thomas, Bachilton, Perth	1856
	Ross, William, Greenside, Largo	1859
	Roughead, David, Seedsman, Haddington	1850
3100	Rowan, John Martin, Atlas Works, Glasgow	1857
	Rowand, Alexander, Glasgow	1844

		Admitted
	Rowat, Thomas, Currievale, Currie	1855
	Roy, Alexander, Waterton, Insch, Aberdeen	1856
	Roy, Frederick Lewis, of Nenthorn, Kelso	1837
	Roy, James, junior, Seedsman, Aberdeen	1840
	Roy, Robert, W.S., Chester	1822
	Royds, Robert Whyt	1856
	Ruddock, Joseph Willis, Tweed House, Berwick	1863
	Russell, Alexander James, W.S., Edinburgh	1846
3110	Russell, Andrew Walker, of Kenlygreen, Newburgh	1854
	Russell, David, Silverburn, Leven	1859
	Russell, Francis Whitworth	1835
	Russell, George E., Regent Terrace, Edinburgh	1858
	Russell, James, of Aden, Mintlaw	1834
	Russell, James, Saughton Hall Mains, Slateford	1848
	Russell, James, Coalstoun Mains, Haddington	1851
	Russell, James, of Breckonside, Thornhill	1847
	Russell, John, Saughton Hall Mains, Slateford	1862
	Russell, Robert, of Dalnair, Falkirk	1834
3120	Russell, Robert, Pilmuir, Leven	1851
	Rust, James, Paddocklaw, Banff	1858
	Rutherford, George, Monteath's Houses, Gorebridge	1860
	Rutherford, George, Factor, Jedburgh	1863
	Rutherford, George, Printonan, Coldstream	1863
	Rutherford, John, Eldinhope, Selkirk	1863
	Rutherford, John, Muirhall, Perth	1861
	Rutherfurd, Wm. Oliver, of Edgerston, Jedburgh	1825
	Ruxton, Andrew, South Artrochie, Ellon	1854
	Ruxton, John, M.D., Hill of Fiddes, Hill of Menie	1851
3130	Ruxton, William, Farnell, Brechin	1850
	†Sutherland, His Grace George, Duke of	1849
	Sutherland, Her Grace Harriet, Duchess-Dowager of	1834
	Strathmore, The Right Hon. Thomas, Earl of	1852
	†Selkirk, The Right Hon. Dunbar-James, Earl of	1830
	Southesk, The Right Hon. James, Earl of	1850
	Seafield, The Right Hon. John, Earl of	1842
	Stair, The Right Hon. North, Earl of	1843
	Scott, The Right Hon. Lord Henry, M.P.	1861
	Scott, The Right Hon. Lord Walter	1861
3140	†Strathallan, The Right Hon. William, Viscount	1847
	Stormont, The Right Hon. William, Viscount	1861
	Saltoun, The Right Hon. Alexander, Lord	1854
	Sinclair, The Right Hon. Charles, Lord	1829

		Admitted
	SANDILANDS, The Hon. James, Barnton	1855
	SINCLAIR, Sir John Gordon, of Stevenson, Bart.	1832
	STEWART, Sir M. R. Shaw, of Blackhall, Bart., M.P.	1848
	SCOTT, Sir William, of Ancrum, Bart., M.P.	1829
	STEWART, Sir Wm. Drummond, of Grandtully, Bart.	1839
	SETON, Sir William Coote, of Pitmedden, Bart.	1834
3150	SINCLAIR, Sir George, of Ulbster, Bart.	1812
	SUTTIE, Sir George Grant of Balgone, Bart.	1839
	SINCLAIR, Sir John, of Dunbeath, Bart.	1824
	STEUART, Sir Henry M. Seton, of Allanton, Bart.	1835
	STEWART, Vice-Admiral Sir Houston, K.C.B.	1822
	Sadler, Thomas, Norton Mains, Ratho	1838
	Sadler, William, Ferrygate, Dirleton	1853
	Salmon, James, Benston, Paisley	1858
	Salmon, John, Johnstone Castle, Johnstone	1856
	Salmond, Duncan, Rothesay	1846
3160	Salmond, James, Wheatlands, Cramond	1858
	Salmond, Robert, Banker, Glasgow	1845
	Sanderson, Capt. A. C., of Glenlaggan, Castle-Douglas	1844
	Sanderson, James, Manchester Buildings, Westminster	1854
	Sanderson, George B., Hatton Mains, Ratho	1858
	Sands, William John, W.S., Edinburgh	1849
	Sangster, Robert B., Banker, Golspie	1845
	Scarth, James, Banker, Leeds	1820
	Scarth, Pillans, W.S., Leith	1862
	Scarth, Robert, of Binscarth, Kirkwall	1843
3170	Scobie, John, Lochinver, Golspie	1851
	Scoon, Kenneth, Braidwood, Gorebridge	1854
	Scot, William, of Craigmuie, Moniaive	1838
	Scott, Adam, Dalmore, Alness	1851
	Scott, Alexander, Beanston, Prestonkirk	1850
	Scott, Alexander, Oxgang, Slateford	1844
	Scott, Alexander, Hopetoun, South Queensferry	1860
	Scott, Andrew, Glendouglas, Jedburgh	1848
	Scott, Andrew, junior, W.S., Howe Street, Edin.	1861
	Scott, Cartaret G., of Malleny, Balerno	1842
3180	Scott, Charles, Palmerton, Cockburnspath	1857
	Scott, Charles, Corn Merchant, Arbroath	1859
	Scott, Charles C., of Hawkhill, Greenock	1831
	Scott, David	1823
	Scott, David, of Balnakettle, Fettercairn	1859
	Scott, David, Meadowfield, Portobello	1849
	Scott, Admiral George, of Wooden, Kelso	1844
	Scott, Lieutenant-Colonel George	1821

		Admitted
	Scott, Gideon James, Singlee, Selkirk	1861
	Scott, Henry, Crosslee, Selkirk	1853
3190	Scott, Hercules, of Brotherton, Bervie	1859
	Scott, Hugh, of Gala, Galashiels	1846
	Scott, James, of Kelly, Glasgow	1850
	Scott, James, Easter Tullo, Stonehaven	1862
	Scott, James, Enzieholm, Langholm	1859
	Scott, James Fitzmaurice, of Commieston	1843
	Scott, Dr James Robson, of Ashtrees, Yetholm	1863
	Scott, James R. Hope, of Abbotsford, Melrose	1854
	Scott, John, Agrl. Commission Agent, Belford	1862
	Scott, John, Dunbeath Mains, Dunbeath	1850
3200	Scott, John, Finnart House, Greenock	1826
	Scott, John, of Rodono, W.S., Edinburgh	1842
	Scott, John Scott Elliot, Buckholm, Galashiels	1863
	Scott, Peter Redford, of Redford Hill, Edinburgh	1860
	Scott, Captain Robert	1841
	Scott, Thomas, Broomhouse, Berwick-on-Tweed	1855
	Scott, Thomas, Easter Cadder, Kirkintilloch	1857
	Scott, Thomas, of Uddingston, Glasgow	1857
	Scott, Thomas, Whitton, Morebattle, Kelso	1863
	Scott, Thomas Rennie, Castle Mains, Douglas	1827
3210	Scott, Thomas Robson, of Newton, Jedburgh	1860
	Scott, Walter, Glendronach, Huntly	1850
	Scott, William, Timpendean, Jedburgh	1857
	Scott, William	1853
	Scott, William, Wester Rora, Mintlaw	1855
	Scott, William, Mossilee, Galashiels	1855
	Scott, William, of Burnside, Alyth	1862
	Scott, William, Howford, Selkirk	1863
	Scott, William, North Leys, Banchory-Ternan	1857
	Scott, William Inglis, Merchant, Glasgow	1850
3220	Scott, William Monteith, yr. of Ancrum, Jedburgh	1863
	Selby, Ephraim, Hassendean, Hawick	1863
	Sellar, Patrick Plenderleith, Morvich, Golspie	1849
	Sempill, Edward, Moreton-Pinckney, Banbury	1856
	Sempill, John, Ballemenach, Campbeltown	1857
	Semple, Thomas, High Smerly, Campbeltown	1857
	Seaton, Alexander, of Preston, Linlithgow	1854
	Seton, George, Advocate, Edinburgh	1848
	Seton, Henry, V.S., Edinburgh	1859
	Shairp, Major Norman, of Houston, Uphall	1823
3230	Shand, Alexander Burns, Sheriff of Kincardineshire	1863

		Admitted
	Shand, John, W.S., Edinburgh	1844
	Sharp, Andrew, North Forr, Crieff	1861
	Sharp, Francis, Doverhall, Inverkeithing	1858
	Sharp, James	1846
	Sharp, Thomas, Manufacturer, Paisley	1839
	Shaw, Charles, W.S., Sheriff-Substitute, Lochmaddy	1835
	Shaw, David, W.S., Ayr	1836
	Shaw, Hary, Bogfairn, Tarland	1850
	Shaw, Patrick, Advocate, Sheriff of Chancery	1835
3240	Shaw, Thomas, Foster, Glenisla, Alyth	1861
	Shaw, William, Finegaud, Glenshee, Blairgowrie	1861
	Shawe, R. F., of Bartinghame Thorpe, Hull	1838
	Shennan, James, Balig, Kirkcudbright	1857
	Shepherd, George, Shethin, Tarves	1854
	Shepherd, Captain Thomas, of Kirkville, Skene	1858
	Shireff, Charles, Sheriff-Substitute, Dunfermline	1829
	Shirreff, Charles H., Corn Factor, Edinburgh	1859
	Shirreff, Thomas, West Barns, Dunbar	1861
	Shirriff, David, Muirton, Drem	1847
3250	Shirriff, Samuel D., Saltcoats, Drem	1850
	Shortreed, Robert, Attonburn, Yetholm	1854
	Sidey, James, Pitcairngreen, Perth	1852
	Sidney, Samuel, St Alban's Cottage, London	1859
	Sim, Adam, of Culter Mains, Biggar	1836
	Sim, William, Goatfield, Lochgilphead	1857
	Sim, William, Corn Merchant, Arbroath	1858
	Sime, William, Balgray, Inchture	1860
	Simpson, Alexander, Teawig, Beauly	1846
	Simpson, Alexander, Downduff, Forres	1855
3260	Simpson, Alexander Horatio	1830
	Simpson, Alexander, Clerk of Supply, Dumfries	1860
	Simpson, Alexander, Wallyford, Musselburgh	1860
	Simpson, George, Bedrule, Jedburgh	1853
	Simpson, James, Mawcarse, Kinross	1851
	Simpson, James Y., M.D , Professor of Midwifery, University of Edinburgh	1848
	Simpson, Robert, of Cobairdy, Huntly	1839
	Simpson, Thomas H., Gortinlee, Lasswade	1855
	Simson, Charles, of Threepwood, Lauder	1850
	Simson, George, of Pitcorthie, Leven	1841
3270	Simson, George, Courthill, Kelso	1861
	Simson, James, Melrose	1852
	Simson, Thomas, Blainslie, Lauder	1850
	Sinclair, Alexander, George Street, Edinburgh	1839

		Admitted
	Sinclair, Archibald, Glasgow	1859
	Sinclair, Dugald, Kilchamaig, Tarbert	1826
	Sinclair, James, of Forss, Thurso	1830
	Sinclair, James, Westmill, Inchture	1858
	Sinclair, John, of Lochaline, Morvern	1834
	Sinclair, John, Borlum, Glen Urquhart	1856
3280	Sinclair, John, V.S., Auchterarder	1861
	Sinclair, J. G. T., yr. of Ulbster	1857
	Singer, Adam, Wardford, Methlic	1858
	Sivewright, James	1850
	Skelton, George, of Invernettie Lodge, Peterhead	1837
	Skene, George, younger of Rubislaw, Aberdeen	1831
	Skene, Moncrieff, of Pitlour, Strathmiglo	1849
	Skene, William F., W.S., Edinburgh	1831
	Skeoch, Charles, Writer, Glasgow	1858
	Skinner, Captain C. G. M'Gregor, Belfast	1823
3290	Skinner, James, Drumin, Ballindalloch	1827
	Skinner, James, Woodside, Aberdeen	1859
	Skinner, John, Balwhimry, Markinch	1858
	Skirving, Adam, of Croys, Dalbeattie	1857
	Skirving, James, Luffness Mains, Drem	1850
	Skirving, Robert Scot, Camptoun, Drem	1846
	Sleigh, John, Land-Surveyor, Strichen	1858
	Slipper, Robert B., Stamford Hill, London	1863
	Sloan, David, Coach Builder, Dumfries	1861
	Small, David, Writer, Dundee	1843
3300	Small, James, of Dirnanean, Blairgowrie	1859
	Small, Lindsay, Foodie, Cupar	1857
	Small, William, Merchant, Dundee	1843
	Smart, John, Glasgowego, Blackburn, Aberdeen	1858
	Smith, Adam, Stevenson Mains, Haddington	1857
	Smith, Alexander, Civil Engineer, Aberdeen	1847
	Smith, Alexander (A. & W. Smith & Co.), Glasgow	1852
	Smith, Alexander, Letham, Berwick	1863
	Smith, Andrew, Willowbrae House, Edinburgh	1862
	Smith, Andrew, Blackwood, Lesmahagow	1856
3310	Smith, Archibald, Sheriff-Substitute, Glasgow	1838
	Smith, Charles, Whittingham, Prestonkirk	1853
	Smith, Charles Hope Johnstone, Garden Architect	1836
	Smith, David, W.S., Edinburgh	1833
	Smith, David, Easter Balindean, Inchture	1862
	Smith, E. B., of Blackwood House, Ecclefechan	1839
	Smith, George, Minmore, Ballindalloch	1839
	Smith, George Campbell, Land-Surveyor, Banff	1837

		Admitted
	Smith, George, Port-Dundas Road, Glasgow	1862
	Smith, Hugh (Smith Brothers, & Co.), Glasgow	1857
3320	Smith, James, Architect, Glasgow	1838
	Smith, James, Lawhill, Auchterarder	1855
	Smith, James, of Jordanhill, Renfrew	1823
	Smith, James, of Olrig, Thurso	1855
	Smith, James, Phoine, Campbeltown	1857
	Smith, James, New Prestwick, Ayr	1857
	Smith, James, Union Street, Glasgow	1859
	Smith, James, Chanlockfoot, Thornhill	1860
	Smith, James	1857
	Smith, John, Ballochantay, Campbeltown	1857
3330	Smith, John, Advocate, Aberdeen	1851
	Smith, John, Coynachie, Gartly	1858
	Smith, John, Writer, Irvine	1858
	Smith, John Gordon, Nevie, Ballindalloch	1852
	Smith, John T., Goswick, Berwick-on-Tweed	1854
	Smith, Major Hope, of Cruicksfield, Dunse	1853
	Smith, Robert, Stafford Street, Edinburgh	1839
	Smith, Robert, Kersquarter, Kelso	1854
	Smith, Robert, Ladyland, Dumfries	1850
	Smith, R. M , Merchant, Leith	1854
3340	Smith, Thomas, Dalfibble, Dumfries	1850
	Smith, William, Kirknewton	1823
	Smith, William, Cattle Salesman, Edinburgh	1854
	Smith, William, East Learmonth, Coldstream	1854
	Smith, William, West Drums, Brechin	1856
	Smith, William, Line, Ballindalloch	1857
	Smith, William, Hillfold, Monymusk	1858
	Smith, William, Banker, Moniaive	1860
	Smith, William, Stone of Morphie, Montrose	1863
	Smollett, Alexander, of Bonhill, Dumbarton	1826
3350	Smyth, Alexander, Drumduan, Forres	1855
	Smythe, William, of Methven, Perth	1846
	Snodgrass, Allan, Mollandu, Cardross	1857
	Snodgrass, Alexander, Lochkell, Campbeltown	1857
	Snowdowne, James, Longriggs, Tillicoultry	1858
	Somervail, Peter, Glendevon, Linlithgow	1857
	Somervell, Graham, of Sorn, Kilmarnock	1857
	Somerville, James, Merchant, Glasgow	1838
	Somerville, James, Ladyurd, Kirkurd	1848
	Somerville, James, of Bridgend, S.S.C., Edinburgh	1858
3360	Somerville, James, North Kinkell, Auchterarder	1862
	Somerville, John, Dovecot, Noblehouse	1859

		Admitted
	Somerville, Samuel, of Ampherlaw, M.D., Edinburgh	1841
	Somerville, S. H. M., of Broadfield, Port Glasgow	1845
	Somerville, Thomas, of Greenfield, Edinburgh	1845
	Somerville, William, Merchant, Glasgow	1850
	Sorley, John, Thornhill, Blairdrummond	1861
	Souter, Alexander, Banff	1854
	Souter, Francis George, Edinburgh	1840
	Speid, James, of Forneth, Brechin	1843
3370	Speir, Robert, Blair Park, Dalry, Ayrshire	1858
	Speir, Thomas, of Blackston, Paisley	1838
	Speirs, Thomas Dundas, Burnfoot, Houston,	1838
	Spence, Adam White, Merchant, Leith	1860
	Spens, Archibald, Newton House, Perth	1861
	Spens, Nathaniel, of Craigsanquhar, W.S., Edinburgh	1848
	Spens, William, Glasgow	1845
	Spottiswoode, John, of Spottiswoode, Lauder	1812
	Sprot, James, of Spot, Dunbar	1830
	Sprot, John, Ayr	1830
3380	Sprot, Mark, of Garnkirk, Glasgow	1820
	Sprot, Mark, of Riddell, Lilliesleaf	1830
	Sprot, Thomas, W.S., Edinburgh	1826
	Sprunt, James, Over Kinfauns, Perth	1861
	Stables, William Alexander, Cawdor Castle, Nairn	1836
	Starforth, John, Architect, Edinburgh	1854
	Stark, Andrew, Hill of Beath, Crossgates	1858
	Stark, Ralph, Camelon, Falkirk	1862
	Stark, Thomas, Mellendean, Kelso	1863
	Stark, William, of Easter Camps, Ratho	1855
3390	Stark, William, Williamston, Mid-Calder	1861
	Stedman, James, Wester Ulston, Jedburgh	1851
	Steedman, James, Boghall, Roslin	1847
	Steedman, John, Charleston, Dunfermline	1862
	Steel, Christopher, Auchenfranco, Dumfries	1860
	Steel, Samuel, of Waygateshaw, Carluke	1849
	Steel, William Bowdon, Inverardraw, Crieff	1858
	Steele, Robert, Greenock	1853
	Steele, William, Sheriff-Substitute of Dumbarton	1828
	Stegmann, Conrad, Merchant, Leith	1854
3400	Stenhouse, George, West Pilton, Blackhall	1850
	Stenhouse, James, Southfield, Corstorphine	1850
	Stenhouse, James, yr. of Northfod, Cowden Beath	1852
	Stenhouse, James, Myles, Tranent	1861
	Stephen, James, Conglass, Keith-Hall	1858
	Stephen, William, Inchbroom, Elgin	1853

		Admitted
	Stephens, Henry, Redbrae Cottage, Edinburgh	1826
	Steuart, Andrew, of Auchluncart, Keith	1845
	Steuart, Archibald Seton, Alloa	1835
	Steuart, David, of Steuart Hall, Stirling	1857
3410	Steuart, James, W.S., Edinburgh	1842
	Steuart, Patrick, Middlegill, Moffat	1859
	Steuart, Robert, of Westwood, Edinburgh	1833
	Steuart, Robert, of Murdieston, Glasgow	1844
	Steuart, Robert, Brownlee, Carluke	1855
	Steuart, Thomas, Carterhaugh, Selkirk	1852
	Steuart, William, London	1833
	Stevens, Moses, of Bellahouston, Glasgow	1832
	Stevenson, Alexander, Banker, Langholm	1839
	Stevenson, Alexander, Kirkside, Banff	1858
3420	Stevenson, Andrew, Duncanlaw, Gifford	1855
	Stevenson, Charles, Edinburgh	1850
	Stevenson, David, C.E., Edinburgh	1853
	Stevenson, Duncan, Edinburgh	1824
	Stevenson, John, Oban	1842
	Stevenson, John B., Westfield, South Queensferry	1853
	Stevenson, Robert, Banker, Edinburgh	1860
	Stevenson, Thomas, Mount-Lothian, Penicuik	1852
	Stewart, Alexander	1852
	Stewart, Alexander, Tempar, Kinloch-Rannoch	1860
3430	Stewart, Alexander J., W.S., Edinburgh	1858
	Stewart, Alexander, Craigenseat, Huntly	1862
	Stewart, Andrew, Auctioneer, Dumfries	1860
	Stewart, Captain Boxer, of Urrard, Blair-Athole	1858
	Stewart, Charles, Aberfeldy	1834
	Stewart, Charles, of Hillside, Lockerbie	1823
	Stewart, Charles, Solicitor, Inverness	1840
	Stewart, Charles, Bank Agent, Killin	1858
	Stewart, David, London	1842
	Stewart, David, Kippenross, Dunblane	1862
3440	Stewart, Donald, Clachan, Blair-Athole	1859
	Stewart, Lieutenant Duncan, R.N.	1863
	Stewart, George, Kirkchrist, Kirkcudbright	1844
	Stewart, Henry, of St Fort, Newport	1837
	Stewart, Henry Black, of Balnakeilly, Pitlochry	1838
	Stewart, H. G. Murray, of Broughton, Gatehouse	1857
	Stewart, James, Pitskelly, St Martins, Perth	1851
	Stewart, James, New Market, Aberdeen	1854
	Stewart, James, Factor, Erskine, Glasgow	1858
	Stewart, James, Holmestone, Campbeltown	1857

		Admitted
3450	Stewart, John, London	1819
	Stewart, John, of Dalguise, Dunkeld	1823
	Stewart, John, M.D., R.N., of Findynate, Logierait	1839
	Stewart, John, of Nateby Hall, Lancashire	1851
	Stewart, John, Strathaven	1854
	Stewart, John, Upper Ardroscadale, Rothesay	1855
	Stewart, John, Pollockshaws	1857
	Stewart, John, Flodigarry, Portree	1858
	Stewart, John Lorn, of Coll, Campbeltown	1824
	Stewart, John Archibald Shaw, London	1853
3460	Stewart, Malcolm, Fife Keith, Keith	1862
	Stewart, Mark S., of Southwick, Dumfries	1837
	Stewart, Neil P., Biallid, Kingussie	1863
	Stewart, Osmond de Havilland, Waterhead, Lockerbie	1859
	Stewart, Peter, Cowburn, Lockerbie	1860
	Stewart, Robert, of Ballechin, Dunkeld	1854
	Stewart, Robert, of Ingliston, Kirkliston	1858
	Stewart, Robert Balfour, yr. of St Fort, Newport	1859
	Stewart, Robert Hawthorn Johnstone, of Straiton	1846
	Stewart, Samuel, Sandhole, Strichen	1857
3470	Stewart, Stair Hawthorn, of Physgill, Whithorn	1828
	Stewart, Thomas, Gillenbie, Lockerbie	1859
	Stewart, Walter, Mains of Kynachan, Pitlochry	1859
	Stewart, William, Ballaterach, Ballater	1829
	Stewart, William, of Blackhouse, Largs	1844
	Stewart, William, Tonroich, Campbeltown	1850
	Stewart, William, Smerly, Campbeltown	1857
	Stewart, William, Saddler, Aberfeldy	1860
	Stirling, Major Graham, of Craigbarnet, Lennoxtown	1857
	Stirling, James, C.E., Edinburgh, Consulting Engineer to the Society	1852
3480	Stirling, John, of Kippendavie, Dunblane	1833
	Stirling, J. D. Morris, of Blackgrange	1841
	Stirling, Thomas Graham, of Strowan, Crieff	1839
	Stirling, William, of Keir, M.P., Dunblane	1841
	Stirling, William, Glasgow	1855
	Stobie, Thomas, Balneathil, Kinross	1851
	Stobo, Robert, of Hallidayhill, Auldgirth Bridge	1860
	Stodart, Archibald, Covington, Biggar	1855
	Stodart, David, Jerviswood Mains, Lanark	1855
	Stodart, George Tweedie, of Oliver, W.S., Edin.	1839
3490	Stodart, George, of Ballendrick, Perth	1861
	Stodart, James, Walston, Carnwath	1855
	Stodart, James, Drummelzier, Rachan Mill	1855

		Admitted
	Stodart, John, Bangour, Uphall	1851
	Stodart William, Wintonhill, Tranent	1855
	Storrar, James, V.S., The Palace, Dubford, Banff	1859
	Storrie, Francis, V.S., East Linton	1850
	Stott, Gibson, London	1832
	Stott, John, of Netherwood, Dumfries	1855
	Stott, Joseph Hood, Cockburnhill, Balerno	1859
3500	Strachan, James, Wester Fowlis, Alford	1858
	Strachan, Lewis, Cluny of Raemoir, Banchory	1858
	Strang, John, High Crewburn, Strathaven	1857
	Straton, George Thomas, of Kirkside, Montrose	1842
	Strong, Thomas, W.S., Edinburgh	1859
	Struthers, Dr John, Edinburgh	1859
	Stuart, Alexander C., of Eaglescairnie, Haddington	1863
	Stuart, Captain John	1809
	Stuart, David, Huntingtower, Perth	1861
	Stuart, Gilbert, Runningburn, Stitchel, Kelso	1863
3510	Stuart, Samuel M'Dowall, Glasgow	1845
	Sturrock, John, Banker, Dundee	1843
	Sutherland, Eric, Rosevally, Elgin	1853
	Sutherland, George, of Forse, Lybster	1849
	Sutherland, Joseph, Shiness, Lairg	1856
	Sutherland, Robert, Shiness, Lairg	1856
	Sutherland, Sinclair, Little Byth, Turriff	1852
	Suttie, James, Fothringham, Forfar	1855
	Swan, James, Live Stock Agent, Edinburgh	1858
	Swan, James, Pierbanks, Torthorwald	1860
3520	Swan, John, Cattle Salesman, Edinburgh	1851
	Swan, Robert, Writer, Kelso	1852
	Swan, Samuel, Overton, Bush, Jedburgh	1863
	Swan, Thomas, Live Stock Agent, Edinburgh	1858
	Swann, James, Collierhall, Douglas	1861
	Swann, J. R., Leith Walk, Edinburgh	1859
	Swinburne, Major-General T. R., of Marcus, Edin.	1843
	Swinburne, T. A., R.N., of Eilan Shona, Tobermory	1857
	Swinton, Arch. Campbell, younger of Kimmerghame	1841
	Swinton, John Campbell, of Kimmerghame, Dunse	1810
3530	Swinton, Peter Burn, Holyn Bank, Gifford	1862
	Sydserff, Thomas Buchan, of Ruchlaw, Prestonkirk	1853
	Syme, George, Couston, Aberdour	1859
	Syme, James, Professor of Clinical Surgery, University of Edinburgh	1838
	Syme, William, Craigie, Leuchars	1857
	Symington, Thomas	1848

Admitted

†TWEEDDALE, Most Noble George, Marquis of, K.T. 1809
TULLIBARDINE, Most Noble John, Marquis of 1860
TORPHICHEN, The Right Hon. Robert, Lord 1831
THRIEPLAND, Sir Patrick Murray of Fingask, Bart. 1824
3540 TURNER, Major-Gen. Sir George, of Menie, K.C.B. 1828
Tait, Alexander D., of Millrig, Galston 1845
Tait, George, Advocate, Edinburgh 1808
Tait, James, Banker, Kelso 1846
Tait, James, Smallholm Mains, Kelso 1858
Tait, John, Sheriff of Kinross and Clackmannan 1834
Tait, John, Langrig, Whitsome 1861
Tait, Joseph, Lindean, Galashiels 1863
Tait, Joseph, Brankanentham, Portsoy 1852
Tait, William, Vencheon, Selkirk 1863
3550 Tait, William Reid, Heathfield, Thurso 1862
Tawse, John, W.S., Edinburgh 1862
Tawse, John Wardrope, W.S., Edinburgh 1859
Tayler, William James, of Glenbarry, Rothiemay 1858
Taylor, Alexander, Hillhouse, Lauder 1863
Taylor, George, of Kirtonhill, Montrose 1858
Taylor, John B., Seton West Mains, Prestonpans 1858
Taylor, Malcolm, Ardnadam, Dunoon 1853
Taylor, John, Redcastle, Chance Inn 1861
Taylor, Robert, Laggan, Campbeltown 1857
3560 Taylor, Robert, Dumfrimry, Banchory 1857
Taylor, William, Scotstown Park, South Queensferry 1828
Templeton, Robert, Rannachan, Campbeltown 1857
Tennant, Charles of the Glen, Peebles 1853
Tennant, Charles J., St Rollox, Glasgow 1838
Tennant, Hugh, of Wellpark, Glasgow 1838
Tennant, John, St Rollox, Glasgow 1833
Thallon, Robert, Devon, Kennoway 1859
Thew, Edward, Shortridge House, Alnwick 1855
Thom, James, Quethillhead, Durris, Aberdeen 1858
3570 Thomas, James, Forthar, Kettle 1855
Thomas, Robert, Manure Manufacturer, Newtyle 1861
Thompson, Andrew, Berwick-on-Tweed 1845
Thompson, John, Paston, Coldstream 1856
Thompson, Richard, Cheswick East House, Berwick 1854
Thoms, Alexander, of Rumgally, Cupar-Fife 1842
Thoms, Patrick Hunter, of Aberlemno, Dundee 1861
Thomson, Alexander, of Banchory, Aberdeen 1821
Thomson, Alexander, Banker, Greenock 1825

		Admitted
	Thomson, Alexander, Chapelton, Haugh of Urr	1858
3580	Thomson, Alexander, W.S., Edinburgh	1838
	Thomson, Arthur, Banker, Aberdeen	1841
	Thomson, David	1859
	Thomson, George, of Burnhouse, Stow	1836
	Thomson, George	1854
	Thomson, James, Papple, Haddington	1828
	Thomson, James, Mungoswells, Dunse	1855
	Thomson. James, Linton Cottage, West Linton	1858
	Thomson, James, of Acreheads, Dumfries	1861
	Thomson, John Anstruther, of Charleton, Colinsburgh	1848
3590	Thomson, Peter, Cowcoch, Abergele, North Wales	1859
	Thomson, Robert, Seggie, Guard Bridge	1857
	Thomson, Robert, Nether Cassock, Langholm	1859
	Thomson, Samuel, Blaiket, Crocketford, Dumfries	1859
	Thomson, Thomas, Merchant, Glasgow	1850
	Thomson, William Thomas, Edinburgh	1841
	Thomson, William, of Balgowan, Perth	1844
	Thomson, William, Grain Merchant, Edinburgh	1854
	Thomson, William, Frederick Street, Edinburgh	1860
	Thomson, William, Burnbank, Blair Drummond	1861
3600	Thorburn, David, Calgary, Tobermory	1859
	Threshie, David Scott, W.S.	1824
	Thynne, William, Hoprig Mains, Tranent	1859
	Timins, William, of Hillfield, Stanmore, Middlesex	1844
	Tindal, James, Stonehaven	1849
	Tod, Alexander, Aitkendean, Carrington, Lasswade	1859
	Tod, Alexander, Gorgie Mains, Slateford	1854
	Tod, George, Lochran, Blair-Adam	1851
	Tod, Peter, of Meikleholmside, Moffat	1829
	Tod, Robert, Cardrona, Noblehouse	1853
3610	Tod, William, Gospetrie, Kinross	1851
	Tod, William, Cattle Agent, Edinburgh	1851
	Tod, William, Elphinstone Tower, Tranent	1852
	Tod, William, of Hilton, Cupar	1857
	Tod, William, of Ayton, Bridge of Earn	1862
	Todd, The Rev. Andrew, D.D., Alvah, Banff	1858
	Todd, James, Dunure Mains, Ayr	1858
	Todd, John, of Finnich, Dumbarton	1838
	Todd, John, Valuator, Perth	1861
	Torrance, George M'Micken, of Threave, Edinburgh	1827
3620	Torrance, George, Sisterpath, Dunse	1863
	Torrance, Thomas, Whitsome Laws, Chirnside	1863
	Torrance, William, Hyvotsbank, Liberton	1831

		Admitted
	Townsend, Joseph, Crawford Street, Glasgow	1859
	Trail, Dr J. R., Tombeg, Monymusk	1858
	Traill, George, of Ratter, M.P., Dunnet	1822
	Traill, William, of Woodwick, Orkney	1821
	Traquair, Ramsay H., Colinton	1846
	Trench, Henry, of Cangort Park, Shinrone, Ireland	1857
	Trotter, Archibald, of Castlelaw, Edinburgh	1845
3630	Trotter, Charles, of Woodhill, Blairgowrie	1841
	Trotter, George, Oatridge, Linlithgow	1860
	Trotter, John P., Sheriff-substitute, Dumfries	1831
	Trotter, Richard, of Mortonhall, Liberton	1836
	Trotter, Robert Knox, of Ballindean	1829
	Tudhope, George, Colinhill, Strathaven	1850
	Tullis, Robert, of Grange, St Andrews	1861
	Turnbull, Alexander, Houndalee, Morpeth	1854
	Turnbull, Archibald, of Bellwood, Perth	1826
	Turnbull, Gregor, Merchant, Glasgow	1857
3640	Turnbull, John, Dunse	1855
	Turnbull, John, of Abbey St Bathans, W.S., Edin.	1844
	Turnbull, Joseph, Bonhill Place, Dumbarton	1838
	Turnbull, Mark, Melrose Mills, Melrose	1862
	Turnbull, Phipps, Windsor Villa, Edinburgh	1841
	Turnbull, Phipps, junior, Little Pinkerton, Dunbar	1859
	Turnbull, Robert L., Falnash, Hawick	1854
	Turnbull, Stewart, Bonhill Place, Dumbarton	1850
	Turnbull, William, Falnash, Hawick	1855
	Turnbull, William, Graden, Kelso	1863
3650	Turnbull, William George, Spittal, Cavers	1863
	Turner, Angus, Town-Clerk, Glasgow	1844
	Turner, Duncan, Corachaine, Dunoon	1853
	Turner, Fred. J., The Dean, Kilmarnock	1859
	Turner, John, of Turnerhall, Ellon	1853
	Turner, Richard, Broompark, Midcalder	1855
	Turner, Thomas, Northrigg, Haddington	1855
	Turner, William, Gavinburn, Old Kilpatrick	1863
	Tweedie, Alexander, Coats, Haddington	1859
	Tweedie, David, Castle Crawford, Abington	1853
3660	Tweedie, James, of Quarter, Rachan House, Peebles	1860
	Tytler, James Stuart, of Woodhouselee, W.S., Edin.	1863
	Tytler, William Fraser, of Aldourie, Inverness	1860
	Urquhart, John Grubb, of Vellore, Linlithgow	1858
	Urquhart, William Pollard, of Craigston, M.P.	1851
	Usher, John, Stodrig, Kelso	1853

		Admitted
	Vallance, Hugh, Greathill, Strathaven	1857
	Vallentine, James, Arnhall, Brechin	1850
	Vallentine, John, Nether Afflock, Skene	1858
	Vassall, Colonel Rawdon, Culdees Castle, Muthil	1860
3670	Veitch, Christopher, Bridgend, Linlithgow	1853
	Veitch, James, of Eliock, Sanquhar	1822
	Vere, Charles E. Hope	1856
	Vere, W. E. Hope, of Craigiehall, Edinburgh	1846
	Vernor, James A., Hillhead, Musselburgh	1829
	†Wemyss, The Right Hon. Francis, Earl of	1819
	†Willoughby, d'Eresby and Gwydir, The Right Honourable Peter, Lord	1808
	Wharncliffe, The Right Hon. Edward, Lord	1863
	Walpole, The Honourable Henry, Wolterton Park	1845
	Wauchope, Sir John Don, of Edmonstone, Bart.	1842
3680	Waddell, William, of Easter Moffat, W.S., Edinburgh	1818
	Wakefield, J. Collen, Eastwood Park, Thornliebank	1857
	Wakelin, John, Oil Mills, Musselburgh	1857
	Waldie, James, Millisle, Garlieston	1855
	Waldie, John, of Henderside Park, Kelso	1826
	Walker, Alexander, Brightmony, Nairn	1855
	Walker, A. R., Wester Fintray, Keith Hall	1854
	Walker, Bethune James, of Fallfield, Largo	1835
	Walker, Charles, Drumblair, Huntly	1847
	Walker, Fountaine, of Foyers, Inverness	1861
3690	Walker, Francis, Craignetherty, Turriff	1857
	Walker, Francis, Nisbet, Kelso	1863
	Walker, Major George G., of Crawfordton, Dumfries	1858
	Walker, Henry West, Banker, Auchtermuchty	1861
	Walker, James, of Dalry, Edinburgh	1860
	Walker, James, of Blairton	1847
	Walker, James, Kilpunt, Broxburn	1854
	Walker, James, Cawder Cuilt, Maryhill	1857
	Walker, J. W., Ravensnook, Penicuik	1856
	Walker, John, W.S., Edinburgh	1848
3700	Walker, John, Eastfield, Springburn	1857
	Walker, John Ewing, Cawder Cuilt, Maryhill	1857
	Walker, John, Maryfield, Bressay, Shetland	1862
	Walker, Matthew, Glasgow	1844
	Walker, Robert, Lathamhill, Glasgow	1844
	Walker, Rt., Hillside House, Portlethen, Aberdeen	1847
	Walker, Robert, Montbletton, Banff	1853

		Admitted
	Walker, Robert, Leuchars House, Elgin	1854
	Walker, Robert, of Pittencrieff, Cupar	1857
	Walker, Robert, Altyre, Forres	1859
3710	Walker, Robert, Gannochy, Perth	1861
	Walker, Dr Thomas, of Polmont Bank, Polmont	1843
	Walker, Thomas, Winthank, St Andrews	1861
	Walker, Walter, Muirhead, Dairsie	1859
	Walker, William, Wholeflatts, Grangemouth	1854
	Walker, William, Ardhunckart, Mossat	1858
	Walker, William S., of Bowland, Stow	1835
	Wallace, David, Balgrummo, Leven	1852
	Wallace, James, Brake, Denino, Fife	1861
	Wallace, John, Illieston, Broxburn	1861
3720	Wallace, Robert A., Lochryan, Stranraer	1857
	Wallace, William, of Auchinvole, Kilsyth	1844
	Wallace, William, Drumlemble, Campbeltown	1857
	Walrond, Theodore, of Calder Park, Baillieston	1850
	Wardlaw, Major James, Balmaduthy, Munlochy	1856
	Warnock, Andrew, Bearyards, Bishopbriggs	1857
	Warrack, William, Newmill of Fintray, Aberdeen	1862
	Warrender, George, yr. of Lochend	1858
	Warwick, William, Glencartholm, Canonbie	1859
	Wason, Rigby, of Corwar, Barrhill	1836
3730	Waterston, Charles, Banker, Inverness	1839
	Watherston, John, Builder, Edinburgh, Master of Works to the Society	1861
	Watson, Crawford, Netherton of Logie, Peterhead	1855
	Watson, Douglas, Thuster, Wick	1859
	Watson, George, Dalkeith Park	1854
	Watson, George, of Ratho, Edinburgh	1848
	Watson, Henry, Lingerwood, Lasswade	1858
	Watson, Henry George, Accountant, Edinburgh	1841
	Watson, Hugh, The Den of Kinnoul, Perth	1828
	Watson, John, junior, Over Johnston, Motherwell	1857
3740	Watson, John, Mumrills, Falkirk	1857
	Watson, Peter, Campbeltown	1847
	Watson, R. H., Bolton Park, Wigton, Cumberland	1852
	Watson, Thomas, Esperston, Gorebridge	1852
	Watson, William, of Bucklands, Hawick,	1841
	Watson, William, The Binns, Dundee	1852
	Watson, William, Engineer, Errol	1861
	Watson, William Scott, of Burnhead, Hawick	1863
	Watt, Gordon, Hirn, Banchory	1858
	Watt, James, Biggar	1856

		Admitted
3750	Watt, Wm. W. Graham, yr. of Skale, Stromness	1858
	Wauchope, Andrew, of Niddry Marischall, Liberton	1840
	Waugh, John, of St John's Kirk, Biggar	1857
	Webster, Andrew, of Rutherford, Edinburgh	1861
	Webster, James, S.S.C., Edinburgh	1853
	Webster, James, Hamilton	1853
	Webster, John, Advocate, Aberdeen	1858
	Webster, John, Thankerton, Holytown	1839
	Webster, John, New Horndean, Berwick	1863
	Webster, Robert, Gavel House, Kilsyth	1856
3760	Webster, William, Daill, Islay	1838
	Weddell, John Wilkie, Lauder Barns, Lauder	1863
	Wedderburn, F. L. S., of Wedderburn, Cupar	1844
	Wells, William, of Holmewood, Stilton	1859
	Welsh, Alexander, Spott, Dunbar	1850
	Welsh, David, Tillytoghills, Brechin	1855
	Welsh, James, of Meikle Firthhead, Dalbeattie	1860
	Welsh, John, Kirkton, Hawick	1860
	Welsh, Thomas, of Earlshaugh, Ericstane, Moffat	1853
	Welwood, Allan A. Maconochie, of Garvoch	1842
3770	Wemyss, David Sinclair, of Southdun, Wick	1846
	Wemyss, James, of Wemyss Hall, Cupar-Fife	1841
	Wemyss, James Hay Erskine, of Wemyss, M.P.	1854
	Wetherell, William, Aldbrough, Darlington	1836
	Whitaker, John, of Kelton, Dumfries	1860
	White, Alexander, Merchant, Leith	1829
	White, Alexander, Causeway Bank, Chirnside	1863
	White, Henry W., of Monar, Inverness	1842
	White, James, Royal Terrace, Edinburgh	1842
	White, James, Stockbroker, Edinburgh	1862
3780	White, James, of Overton, Dumbarton	1863
	White, John, of Drummelzier, Rachan Mill	1842
	White, John, of Grouger, Kilmarnock	1863
	White, Peter, Accountant, Glasgow	1838
	White, Robert, W.S., Edinburgh	1842
	White, Samuel, Ludgate, Stow	1859
	White, William, Merchant, Glasgow	1838
	White, William, of Dykehead, Carnwath	1854
	White, William Logan, of Keillerstain, Hermiston	1856
	Whitehead, Joseph, of Kilnside, Paisley	1845
3790	Whitelaw, Alexander, Gartsherrie House, Gartsherrie	1859
	Whittet, George, Whitehouse, Cramond	1850
	Whitton, Andrew, of Couston, Newtyle	1861
	Whyte, Francis, M.D., Perth	1861

		Admitted
	Whyte, George, of Meethill, Peterhead	1851
	Whyte, John, Ballochoylo, Dunoon	1853
	Whyte, Rev. Robert, Dryfesdale, Lockerbie	1860
	Wight, Thomas, Wire-Worker, Perth	1861
	Wightman, James Seton, of Courance, Lockerbie	1827
	Wilkie, Andrew, Banker, Leven	1860
3800	Wilkie, Duncan, Kirriemuir	1843
	Wilkie, George, Cowdenlaws, Dysart	1857
	Wilkie, James, C.A., Edinburgh	1863
	Wilkie, James, S., Holeton of Arlary, Kinross	1861
	Wilkie, John, of Foulden, Berwick	1830
	Wilkie, William, of Bonnington, Ratho	1824
	Wilkin, Thomas, Tinwald Downs, Dumfries	1862
	Willbank, Jonas, Keighley, Yorkshire	1854
	Williamson, Andrew F., Caskieben, Blackburn	1858
	Williamson, B. K., of Cardrona, Peebles	1863
3810	Williamson, David Robertson, of Lawers, Crieff	1861
	Williamson, Donald, Banker, Tain	1847
	Williamson, George, Shempston, Elgin	1850
	Williamson, James, Newtown of Mountblairy, Banff	1853
	Williamson, James, of Banniskirk, Thurso	1857
	Williamson, John W., of Westgreen, Kinross	1829
	Willis, Thomas, Manor House, Caperby, Bedale	1854
	Willison, James P., Dalpeddar, Sanquhar	1857
	Willison, John, Parish Holm, Douglas	1858
	Wilson, Adam, Auchengownie, Forgandenny	1861
3820	Wilson, Adam, Midshiels, Hawick	1861
	Wilson, Alexander, Kilnhilloch, Cullen	1842
	Wilson, Alexander, Fetterletter, Fyvie	1854
	Wilson, Alexander, Crosskill, Campbeltown	1857
	Wilson, Andrew, Waterside of Forbes, Aberdeen	1850
	Wilson, George, Dalmarnock, Glasgow	1847
	Wilson, George, Harelaw, Ayton	1859
	Wilson, George, Mills of Drum, Banchory	1857
	Wilson, Jacob, Manor House, Woodhorn, Morpeth	1859
	Wilson, James, Auchaleek Campbeltown	1848
3830	Wilson, James, jun., Auchaleek, Campbeltown	1857
	Wilson, James, Banker, Inverness	1840
	Wilson, James, Glasgow	1844
	Wilson, James, Wester Cowden, Dalkeith	1848
	Wilson, James, Burnetland, Biggar	1854
	Wilson, James, Old Mill, New Cumnock	1857
	Wilson, James, Banker, Kilmarnock	1858
	Wilson, James, jun., Newton, Dalkeith	1860

		Admitted
	Wilson, John, of Auchineden. Strathblane	1835
	Wilson, John, of Cumledge, Dunse	1841
3840	Wilson, John, Crosshouse, Roslin	1848
	Wilson, John, Billholm, Langholm	1850
	Wilson, John, Edington Mains. Chirnside	1851
	Wilson, John, Professor of Agriculture, University of Edinburgh	1855
	Wilson, John, Nicolton, Polmont	1855
	Wilson, John, Overhouse, Strathaven	1857
	Wilson, John, of Carlinside, Lanark	1859
	Wilson, John, House of Muir, Roslin	1859
	Wilson, John, Chapelhill, Cockburnspath	1862
	Wilson, John, of Hill Park, Bannockburn	1863
3850	Wilson, John, of Otterburn, Morebattle	1863
	Wilson, John Pettigrew, Advocate, Edinburgh	1863
	Wilson, Philip, Corn Factor, Dunse	1857
	Wilson, Richard, Accountant, Edinburgh	1858
	Wilson, Robert, Durn, Portsoy	1852
	Wilson, Robert, Firthfield, Anstruther	1852
	Wilson, Robert Sym, of Woodburn, Dalkeith	1841
	Wilson, Thomas, Auchencorrie, Campbeltown	1857
	Wilson, Thomas, Haymount, Kelso	1857
	Wilson, William, W.S., Edinburgh	1849
3860	Wilson, William, Writer, Inverary	1853
	Wilson, William, Gateside, Uphall	1853
	Wilson, William, Wester Brathins, Banchory	1857
	Wilson, William, Balquhain, Alford	1858
	Wilsone, George Ross, Edinburgh	1826
	Wink, George, Accountant, Glasgow	1857
	Wishart, Edward, Merchant, Leith	1855
	Woddrop, Wm. Allan, of Dalmarnock, Noblehouse	1860
	Wood, James, Midtown, King Edward, Banff	1858
	Wood, John, Colinsburgh	1835
3870	Wood, William, Merchant, Leith	1828
	Wood, Wm. E. Colins, of Keithock, Cupar-Angus	1841
	Woodman, William, Stobhill, Morpeth	1856
	Wotherspoon, Archibald, Spotsmains, Kelso	1858
	Wotherspoon, Peter, Upper Dalhousie, Lasswade	1860
	Wright, Andrew, Corstorphine	1853
	Wright, Bryce, Dowhill, Girvan	1857
	Wright, David, Beal, Berwick-on-Tweed	1850
	Wright, James, Glasgow	1839
	Wright, James, Secretary, Royal Bank, Edinburgh	1853
3880	Wright, William, Woodlands, Girvan	1857

		Admitted
	Wylie, David, Depute-Clerk of Session, Edinburgh	1825
	Wylie, George, of Arndean, Dollar	1857
	Wyllie, Alexander Henry, 19 Walker St., Edin.	1863
	Wyllie, James F., Bolfracks, Dunkeld	1833
	Wyllie, James, Bloom, Midcalder	1852
	Wyllie, James, Camstradden House, Luss	1863
	Wyllie, John, New Farm, Mid-Calder	1849
	Wyllie, Walter, Parkhead, Alloa	1857
	Wyllie, W. A., Pensher, Fence Houses, Durham	1855
3890	Yeats, William, of Aquharney, Advocate, Aberdeen	1838
	Young, Alexander, Keir Mains, Dunblane	1852
	Young, Andrew, Lochtyside, Thornton	1859
	Young, George, Solicitor-General	1854
	Young, Harry, of Cleish Castle, Kinross	1842
	Young, James, of Gallowhill, Paisley	1852
	Young, James, Land-Surveyor, Perth	1841
	Young, James, Broadholm, Duntocher	1856
	Young, James A., Orchardtown, Garliestown	1860
	Young, John, Niddry, Winchburgh	1852
	Young, John, Houston Mains, Houston	1857
3900	Young, John, Urioch, Balmaghie, Castle Douglas	1857
	Young, Joseph, of Grange, Burntisland	1848
	Young, William S.	1821
	Young, William D., Edinburgh	1859
	Yuille, Andrew Buchanan, of Darleith, Cardross	1838
	Yule, Colonel Patrick, Royal Engineers	1827
	Yule, Thomas B., Merchant, Leith	1852
3910	ZETLAND, The Right Hon. Thomas, Earl of	1840